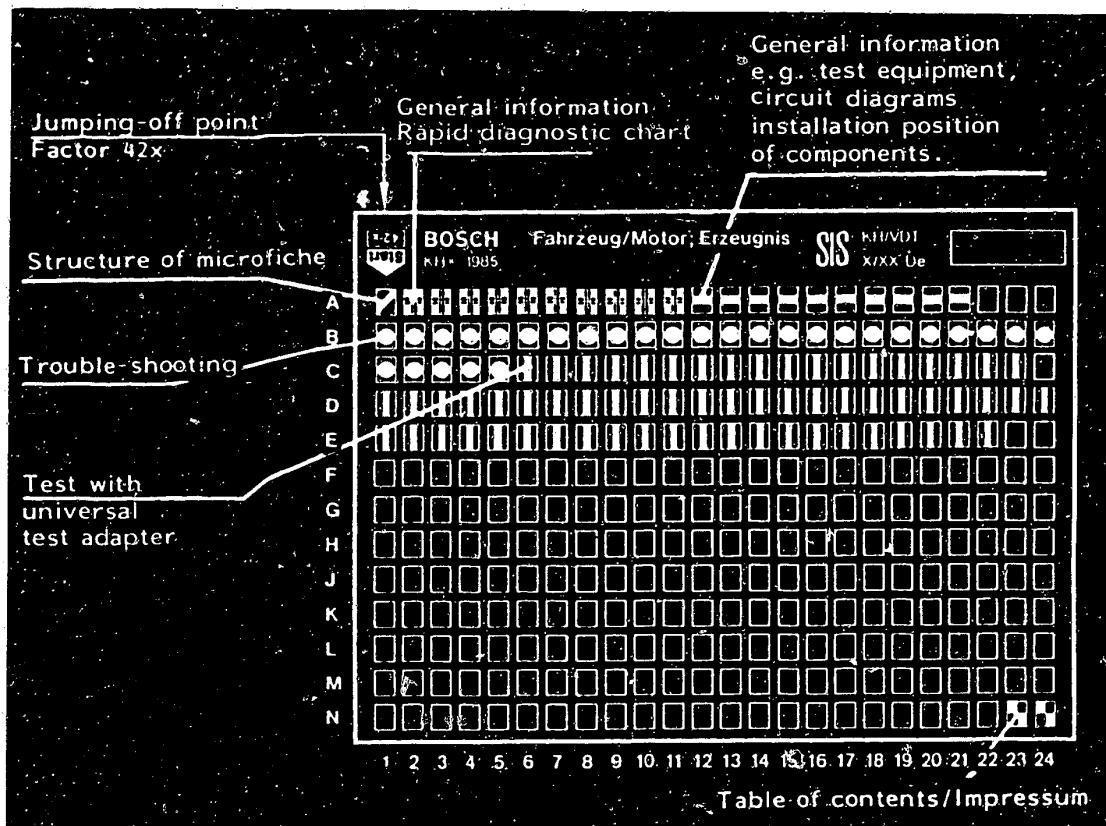


## Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

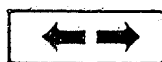
<b>E16</b>	Product/component/test step
	Vehicle/engine

↑ Coordinate

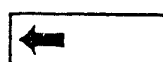
3. Limits of section



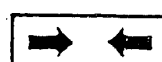
Beginning



Mid-section



End



One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6

**C6**

**A1**

Trouble-shooting program



## 1. Special features

Testing and repair instructions for a trip computer system with trip computer 0 263 001 029, installed in Alfa 90 (successor to Alfetta).

## 2. Rapid diagnosis chart

The following rapid diagnosis chart makes it possible for the experienced expert to quickly test the trip computer and the associated sensors/sensor signals using normal workshop test equipment.

To do this, the universal test adapter is connected between trip computer and vehicle wiring harness using the adapter lead.

The contents of this chart refer to the following information:

- sequence of test steps
  - switches/switch settings on universal test adapter
  - test instructions and test specifications
  - references to coordinates of the respective detailed testing and trouble-shooting program.
- If detailed information and instructions are necessary, always proceed according to the trouble-shooting program starting on Coordinate B 1.



## Requirements for testing

- Check the customer complaint.  
(Check operation of trip computer according to vehicle owner manual).
- Electrical system (fuses, battery voltage O.K.)
- When working on the fuel system, observe accident prevention regulations as well as environmental and health regulations.
- Check all functions with the vehicle stationary and before removing the trip computer.
- Passenger compartment temperature  $\geq 0^{\circ}\text{C}$ .
- Original transmission/differential installed (otherwise change of distance per number of revolutions).
- Original tires (14") mounted (changed rolling circumference means change of distance per number of revolutions). Observe air pressure.
- Engine and injection system not tuned (allocation of input signals to fixed computer program of trip computer may change. Trip computer then shows incorrect readings).



# Rapid diagnosis chart

Test step	Switch setting		Component under test, notes on testing (all measurements to ground)	Pin on 15-pin plug	Test specifications	Coordinates
	V	$\Omega$				
1	↓	1	Ground test on trip computer	1	0 ... 10 $\Omega$	C 6
2	↓	6	(not applicable for Alfa 90 with Motronic) Tank sender resistance (dependent on tank level)	5	0 ... 345 $\Omega$	C 8
3	↓	7	(not applicable for Alfa 90 with L-Jetronic/Motronic/CEM*) Encoding lead 2 ground test pin 7 → pin 1	7	0 ... 10 $\Omega$	C 12
4	↓	8	Temperature sensor ground test	8	0 ... 10 $\Omega$	C 14
5	↓	11	(not applicable for Alfa 90 with L-Jetronic/Motronic) Encoding lead 3 ground test pin 11 → pin 1	11	0 ... 10 $\Omega$	C 16
6	↓	12	(not applicable for Alfa 90 with L-Jetronic/CEM*) Encoding lead 4 ground test pin 12 → pin 1	12	0 ... 10 $\Omega$	C 18
7	↓	13	(not applicable for Alfa 90 with L-Jetronic/CEM*) Encoding lead 5 ground test pin 13 → pin 1	13	0 ... 10 $\Omega$	C 20
8	↓	14	(not applicable for Alfa 90 with L-Jetronic/Motronic/CEM*) Tank sender resistance (dependent on tank level)	14	0 ... 345 $\Omega$	C 22
9	↓	20	Connection for flow sensor	15	approx. 20 000 $\Omega$	D 3

\* CEM = Motronic of Italian origin

**A4**

Rapid diagnosis chart  
Alfa Romeo, trip computer



**A5**

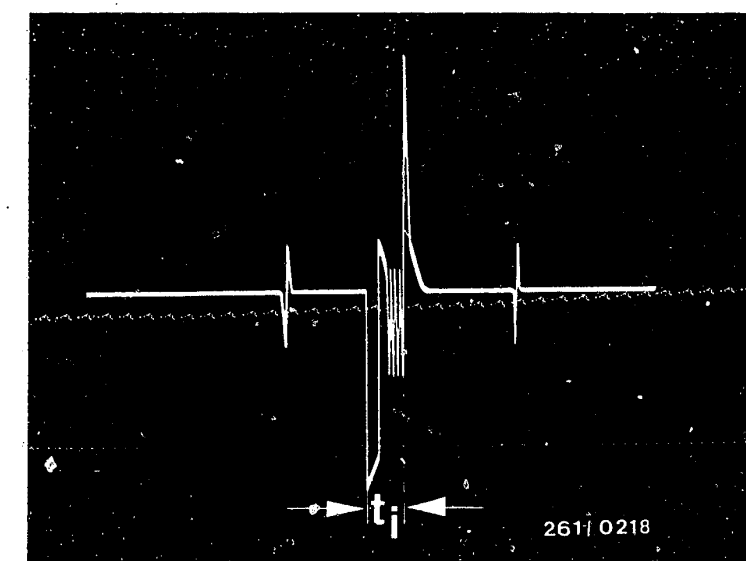
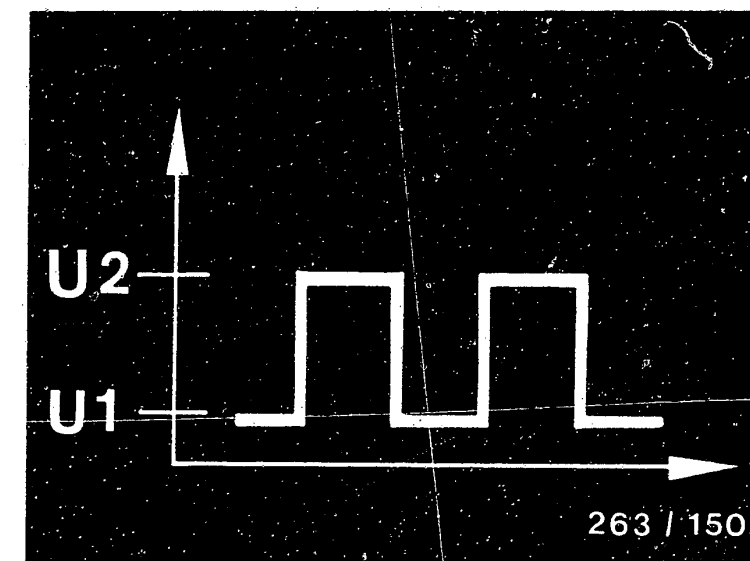
Rapid diagnosis chart  
Alfa Romeo, trip computer





# Rapid diagnosis chart (continued)

Test step	Switch setting		Component under test, notes on testing (all measurements to ground)	Pin on 15-pin plug	Test specifications	Coordinates
	V	$\Omega$				
10	1	-	Power supply to trip computer from term. 30	2	Battery voltage	D 5
11	2	-	Displacement sensor Test with oscilloscope with engine running and drive wheels turning.	3	$U_1 > 0.2 \text{ V}$ $U_2 < 7 \text{ V}$ see top diagram	D 9
12	3	-	Injection signal ( $t_i$ ) (Special input on ignition oscilloscope) Start engine	4	$t_i$ signal present? see bottom diagram	D 11
13	4	-	(not applicable for Alfa 90 with Motronic) tank sender: (Voltages with "ignition on")  Tank full Tank 3/4 full Tank 1/2 full Tank 1/4 full Reserve tank Tank empty	5	approx. 0.5 V approx. 1.0 V approx. 1.5 V approx. 2.3 V approx. 2.5 V approx. 2.7 V	D 13



A6

Rapid diagnosis chart  
Alfa Romeo, trip computer



A7

Rapid diagnosis chart  
Alfa Romeo, trip computer



# Rapid diagnosis chart (continued)

Test step	Switch setting		Component under test, notes on testing (all measurements to ground)	Pin on 15-pin plug	Test specifications	Coordinates
	V	$\Omega$				
14	4	-	(not applicable for Alfa 90 with Motronic) Voltage stabilization for fuel gauge (plug disconnected from tank sender):	5	4.7 - 5.3 V	D 17
15	5	-	Power supply to trip computer through term. 15 (ignition on)	6	Battery voltage	D 21
16	6	-	Outside temperature sensor: Voltage measurement with "ignition on" and at room temperature approx. +20°C	9	approx. 1.7V	D 23
17	7	-	Trip computer illumination (driving lights on, actuate instrument illumination control)	10	Battery voltage	E 1
18	8	-	(not applicable for Alfa 90 with L-Jetronic/Motronic/CEM*) Encoding lead 2 pin 7 → pin 1 engine idling	7	$\geq 3 \text{ V}$	E 3
19	9	-	(not applicable for Alfa 90 with L-Jetronic/Motronic) Encoding lead 3 pin 11 → pin 1 engine idling	11	$\geq 3 \text{ V}$	E 5

\* CEM = Motronic of Italian origin

**A8**

Rapid diagnosis chart  
Alfa Romeo, trip computer



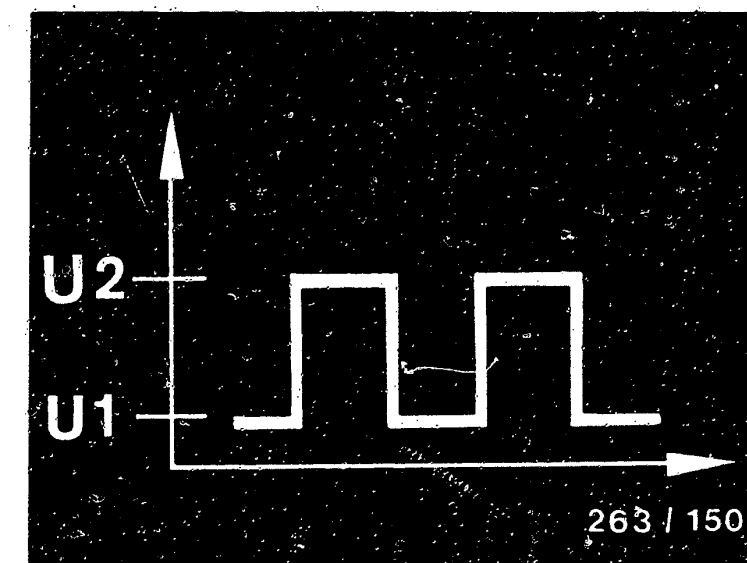
**A9**

Rapid diagnosis chart  
Alfa Romeo, trip computer



# Rapid diagnosis chart (continued)

Test step	Switch setting		Component under test, notes on testing (all measurements to ground)	Pin on 15-pin plug	Test specifications	Coordinates
	V	$\Omega$				
20	10	-	(not applicable for Alfa 90 with L-Jetronic/CEM*) Encoding lead 4 Pin 12 → pin 1 Engine idling	12	$U_2 - U_1 \geq 3 \text{ V}$ see diagram	E 7
21	11	-	(not applicable for Alfa 90 with L-Jetronic/Motronic/CEM*) Encoding lead 5 Pin 13 → pin 1 Engine idling	13	$U_2 - U_1 \geq 3 \text{ V}$ see diagram	E 9
22	12	-	(not applicable for Alfa 90 with L-Jetronic/CEM*) Voltage stabilization for fuel gauge (plug disconnected from tank sender)	14	Battery voltage	E 11
23	12	-	(not applicable for Alfa 90 with L-Jetronic/CEM*) (Voltages with "ignition on") Tank full Tank 3/4 full	14	approx. 1.0 V approx. 3.5 V	
			Tank 1/2 full Tank 1/4 full Reserve tank Tank empty Plug connected to tank sender		approx. 5.3 V approx. 6.8 V approx. 7.0 V approx. 7.5 V	E 15



\*CEM = Motronic of Italian origin

**A10**

Rapid diagnosis chart  
Alfa Romeo, trip computer



**A11**

Rapid diagnosis chart  
Alfa Romeo, trip computer



### 3. General introduction

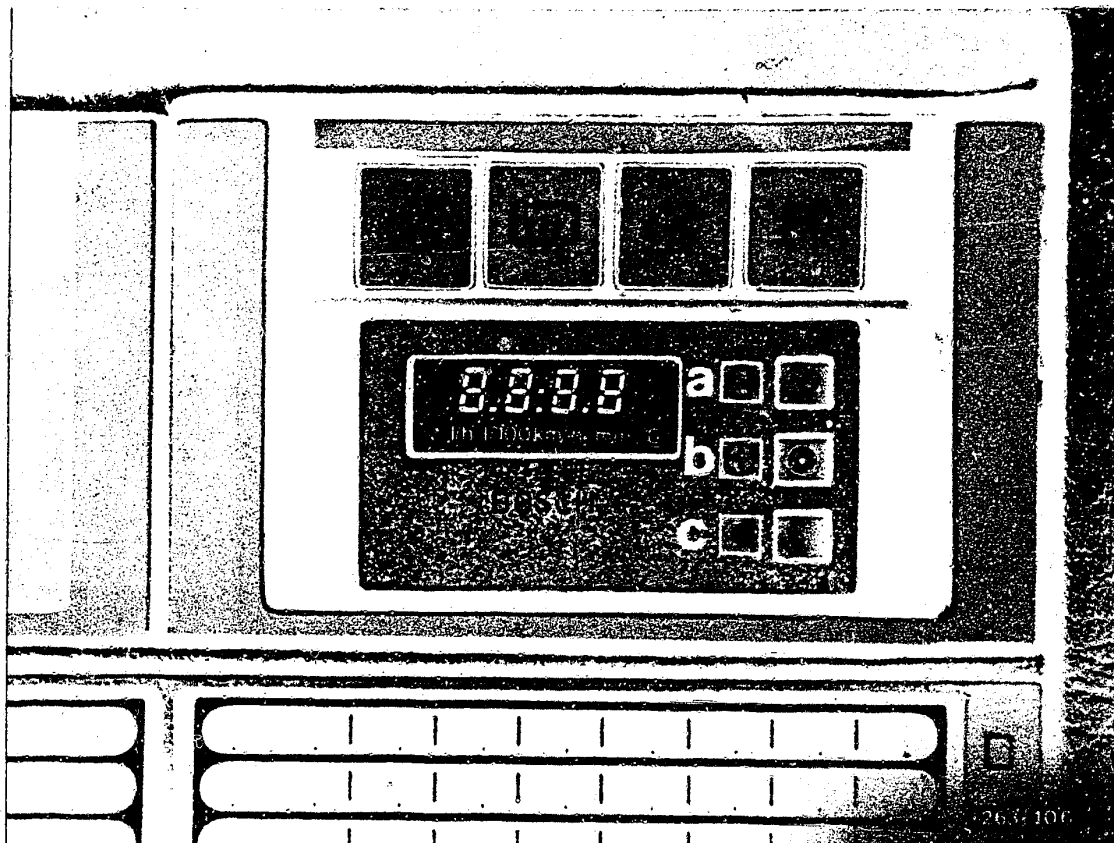
As of mid 1984 Alfa is supplying the vehicle models Alfa 90 (successor to Alfetta) with a trip computer.

BOSCH components are:

Trip computer with energization and evaluation electronics and keyboard (installed in instrument panel)

Outside temperature sensor. NTC resistor in bracket (installed at front in wheelhouse behind the bumper).





The following functions can be called up by means of the keyboard:

Key a

Key for clearing function  
Control of stopwatch  
Hours-Minutes correction

Key b

Priority key for time

Key c, function selection:

Instantaneous consumption  
ave. consumption  
ave. speed  
Range of tank (miles to empty)  
Stopwatch  
Outside temperature

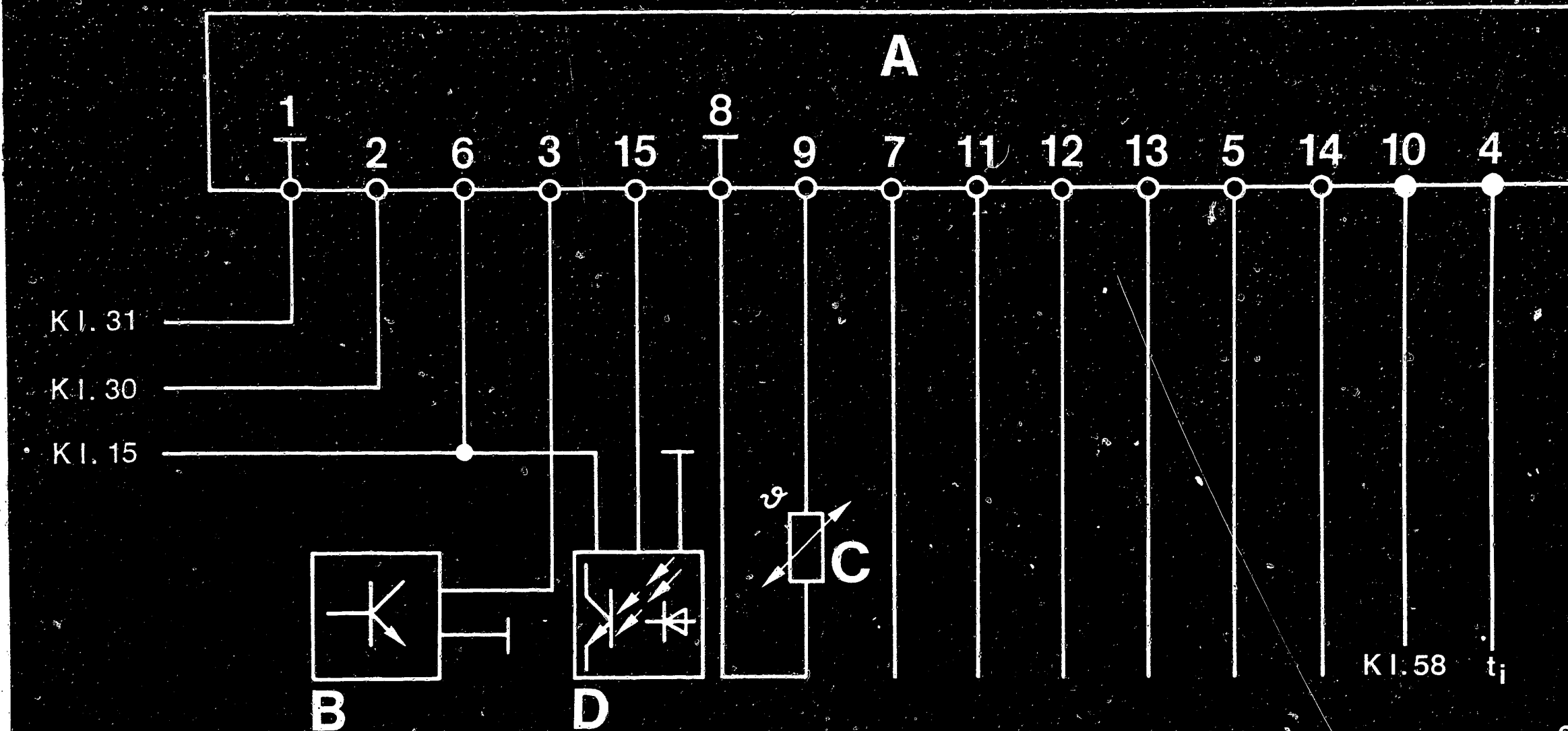


The following signals are used as measured quantities:

1. Resistance of NTC resistor in temperature sensor (Bosch)
2. Duration of injection  $t_i$  of L-Jetronic (version LE)
3. Speed signal from displacement sensor (from Alfa Romeo)
4. Tank sender voltage (from Alfa Romeo)

The timer functions for clock and stopwatch are generated internally in the trip computer. To calculate the functions of average speed and stopwatch, they are processed together with other signals in the trip computer.





263/107

- 1 = Vehicle ground term. 31
- 2 = Battery voltage term. 30
- 3 = Displacement sensor
- 4 = Injection signal  $t_j$
- 5 = Tank sender voltage 5 V
- 6 = Terminal 15
- 7 = Code 2
- 8 = Outside temperature sensor (ground)

- 9 = Outside temperature sensor
- 10 = Light term. 58
- 11 = Code 3
- 12 = Code 4
- 13 = Code 5
- 14 = Tank sender voltage 12 V
- 15 = Auxiliary voltage for flow sensor

- A = Trip computer
- B = Displacement sensor
- C = Outside temperature sensor
- D = Direction of flow

4. Terminal diagram (terminal assignment) of trip computer

**A15**

Terminal diagram  
Alfa Romeo, trip computer



**A16**

Terminal diagram  
Alfa Romeo, trip computer



## 5. Test equipment

Universal test adapter

0 684 101 801

Adapter lead

KDES 0004

Motortester e.g. MOT 201

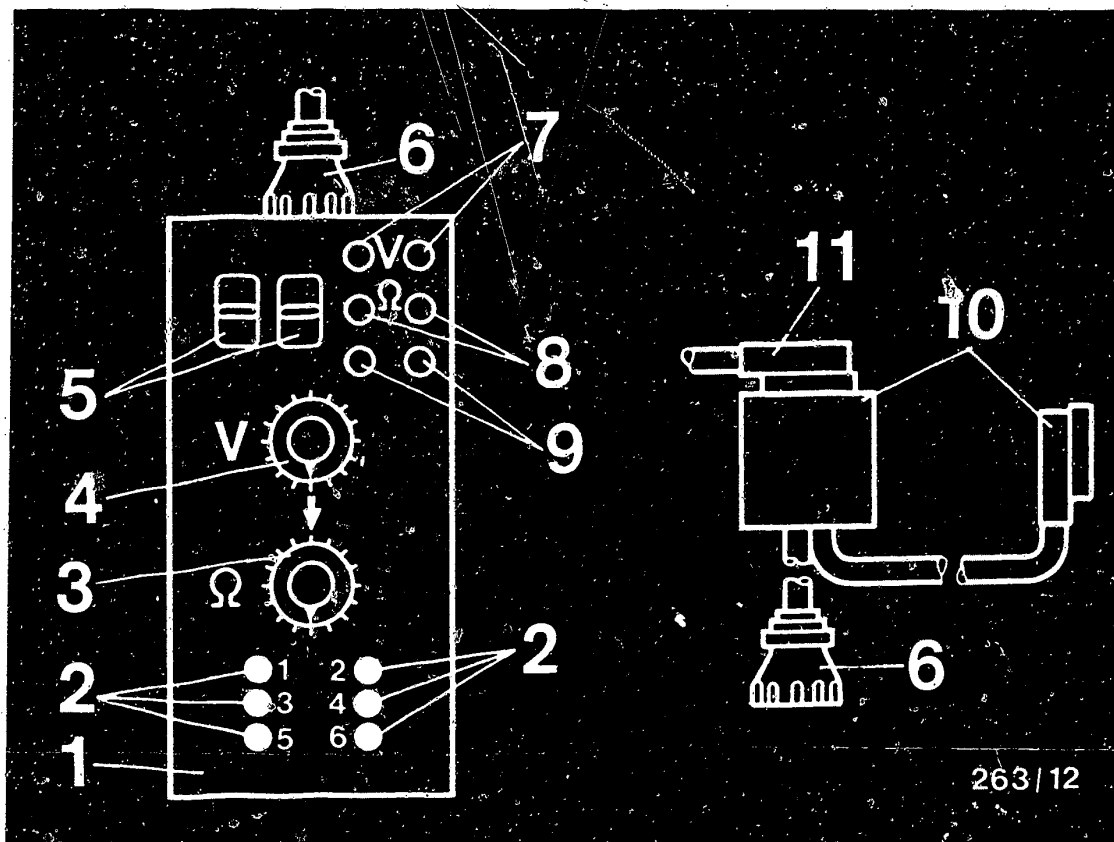
0 684 000 201

Multimeter

Commercially  
available



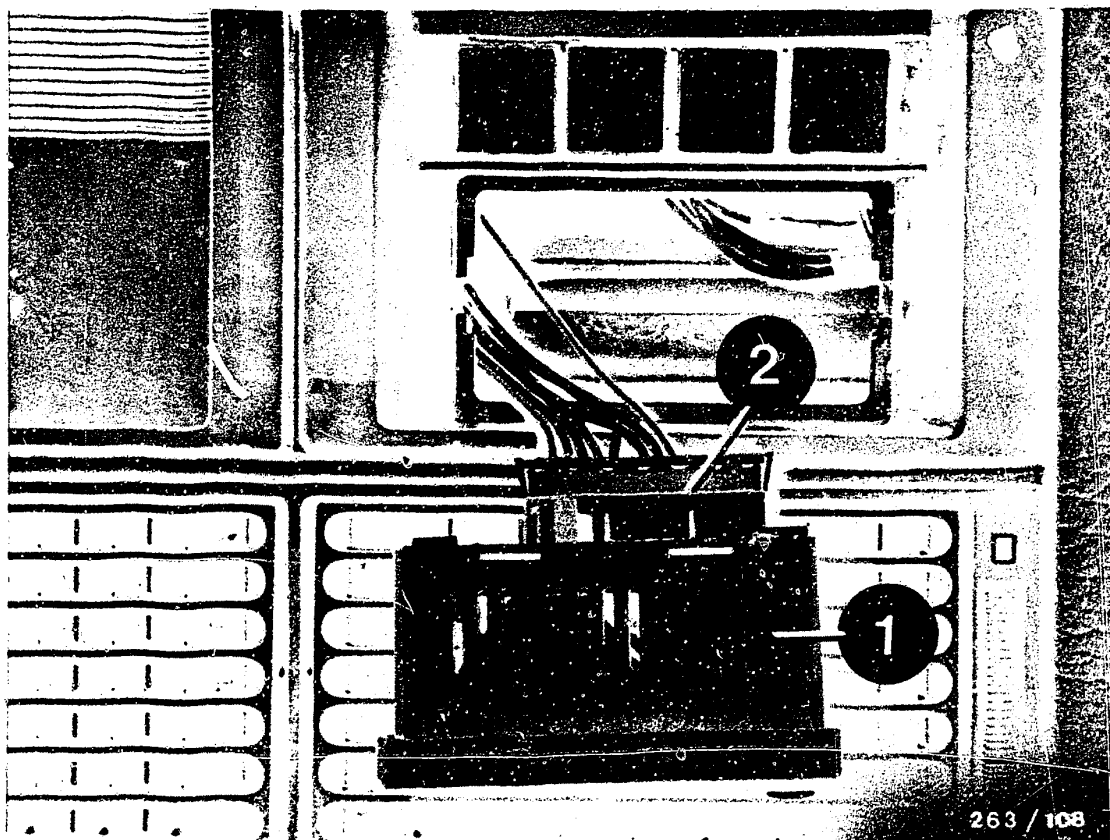




263/12

- 1 = Universal test adapter 0 684 101 801
- 2 = Simulation keyboard
- 3 = Program switch for resistance measurements
- 4 = Program switch for voltage measurements
- 5 = Measuring sockets for special input from Motortester
- 6 = 63-pole plug-in connection for adapter lead
- 7 = Measuring sockets for voltage measurement
- 8 = Measuring sockets for resistance measurements
- 9 = Sockets for special functions (not used yet)
- 10 = Adapter lead KDES 0004 with 15-pole plug
- 11 = 15-pole plug from vehicle wiring harness

### 5.1 Universal test adapter with adapter lead KDES 0004



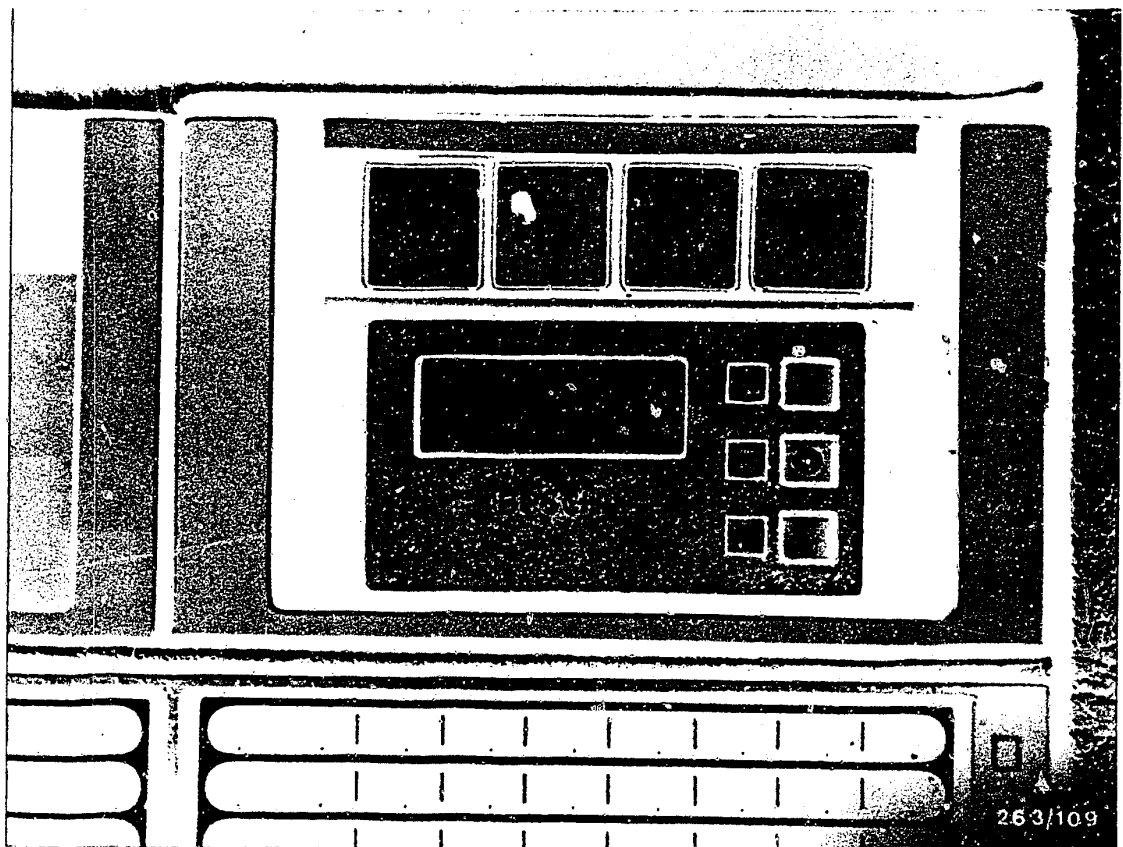
1 = Trip computer  
2 = Plug connector

### 5.2 Connection of adapter lead KDES 0004

Disconnect plug from trip computer and connect to adapter lead KDES 0004.

Connect 15-pin plug of adapter lead KDES 0004 to trip computer.





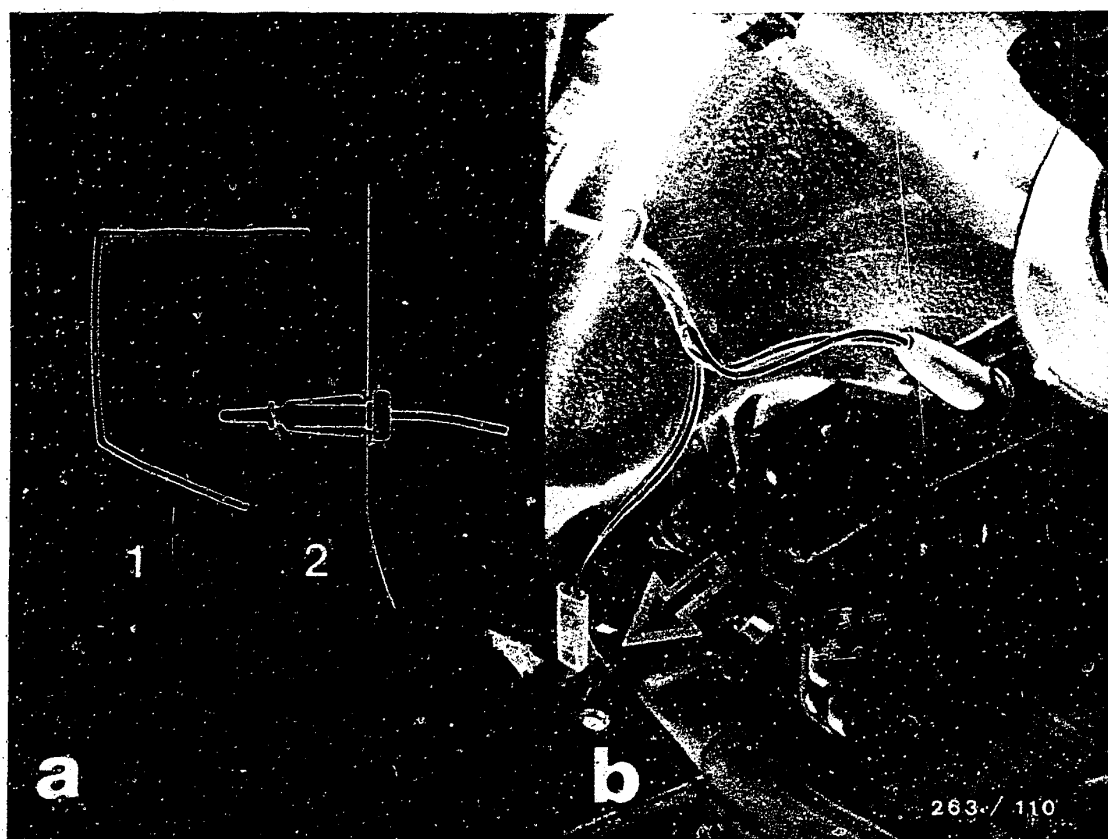
6. Installation position of components and notes  
on removal

The trip computer is in the instrument panel in place of the digital clock, right of the instrument cluster (see picture).

Note on removal:

The trip computer is provided on right and left with 2 locking lugs which latch into the instrument panel.





- 1 = Front bumper  
2 = Temperature sensor

The outside temperature sensor is installed in the wheelhouse behind the bumper (see diagram a).

Note on removal:

Press together the two spring-loaded locking lugs and withdraw outside temperature sensor toward the rear.

The displacement sensor is situated on the transmission (on rear axle) on the left-hand side as viewed in the forward direction of travel (see arrow in picture b).



## 7. Trouble-shooting

Trouble-shooting comprises:

- Functional test of trip computer
- Trouble-shooting according to fault symptoms (customer complaint)
- Removal of trip computer
- Setting the time
- Setting the range (miles to empty)
- Test with universal test adapter



## Requirements for testing

- Check the customer complaint.  
(Check operation of trip computer according to vehicle owner manual; see Coordinates B 3 - B 6 for extract).
- Electrical system (fuses, battery voltage O.K.)
- When working on the fuel system, observe accident prevention regulations as well as environmental and health regulations.
- Check all functions with the vehicle stationary and before removing the trip computer.
- Passenger compartment temperature  $\geq 0^{\circ}\text{C}$ .
- Original transmission/differential installed (otherwise change of distance per number of revolutions).
- Original tires (14") mounted (changed rolling circumference means change of distance per number of revolutions). Observe air pressure.
- Engine and injection system not tuned (allocation of input signals to fixed computer program of trip computer may change. Trip computer then shows incorrect readings).



## 7.1 Functional test

### 7.1.1 General

With the ignition off, the time of day is indicated; all control keys are inoperative. Display illumination is off (see picture 1a). Immediately after switching on the ignition, the display is suppressed for approx. 1 sec.

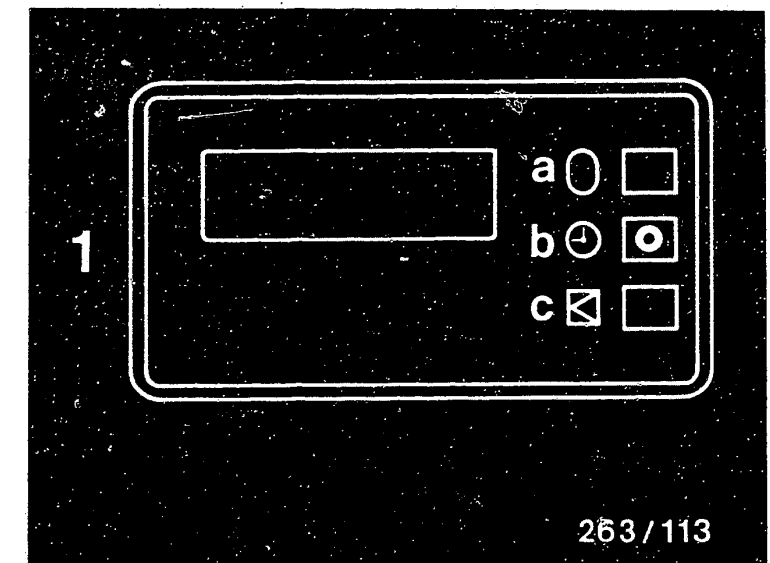
With the ignition on, the time-of-day display remains until key "c" is actuated. Exception: miles-to-empty warning which has priority (see picture 1b, 2a).

With ignition and lights on, a high illumination level is set; with driving lights additionally on, a lower illumination level is set.

### 7.1.2 Function selection with key "c" (see picture 1)

With the ignition on, brief pressing of key "c" causes the functions to appear separately in the following order:

a) instantaneous consumption (see picture 2b).



**B3**

Trouble-shooting (functional test)  
Alfa Romeo, trip computer



**B4**

Trouble-shooting (functional test)  
Alfa Romeo, trip computer



### Function selection with key "c" (continued)

- b) Average consumption (see picture 2c)
- c) Average speed (see picture 2d)
- d) Range of tank (miles to empty)
- e) Stopwatch
- f) Outside temperature
- g) Instantaneous consumption  
etc.

#### Note:

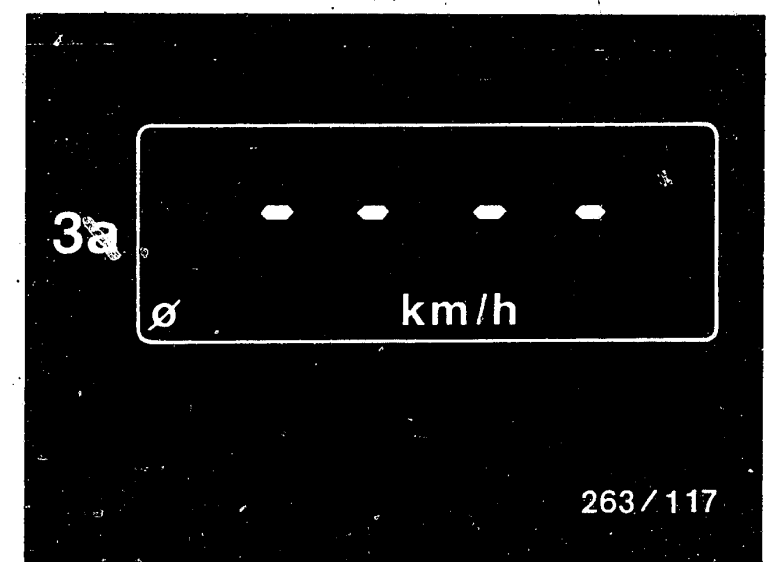
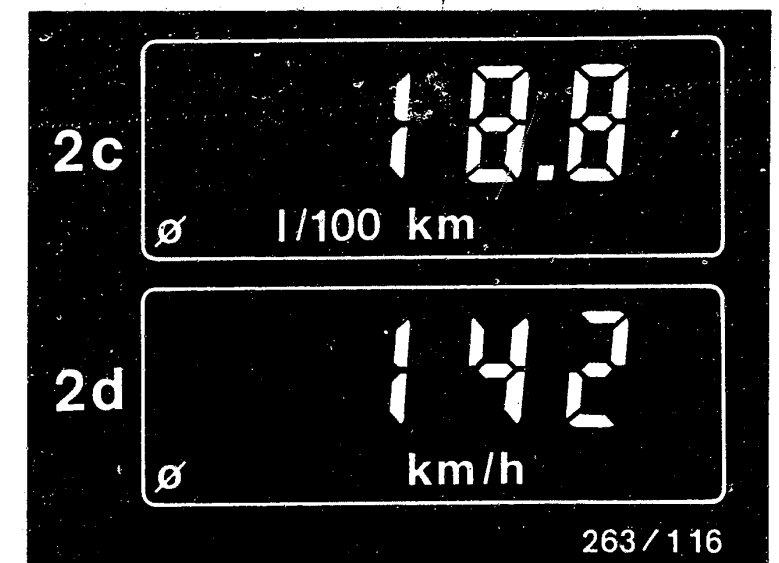
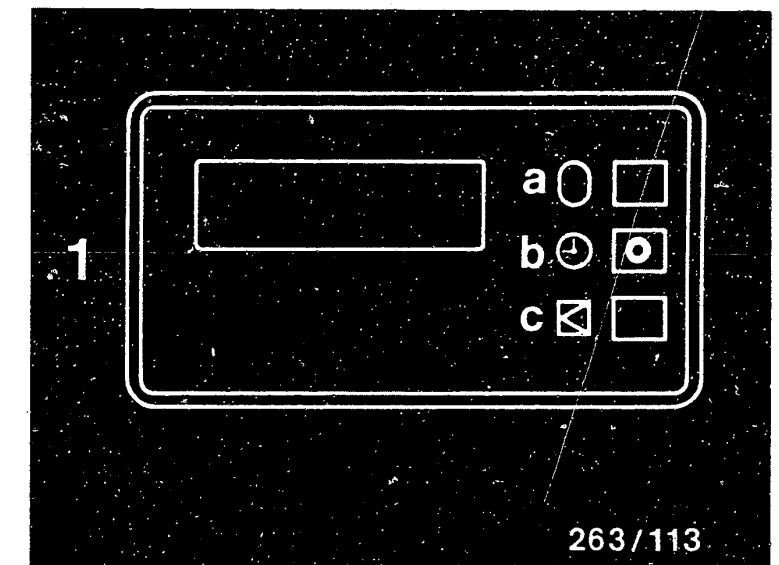
If pressed longer ( $\geq 1$  s), this causes automatic rollover of functions.

#### 7.1.3 Resetting of function / Control of stopwatch with key "a" (see picture a)

If key "a" is pressed for more than 1 sec in "average speed" mode, this causes the memory of the displayed function to be reset and this function is calculated anew. When calculation starts anew, 4 horizontal bars (see picture 3a) appear for 1 sec.

If key "a" is pressed in "stopwatch" mode, this causes the stopwatch to be operated in the following sequence:

Stop - Reset - Start - Stop etc.





#### 7.1.4 Priority for time of day, key "b" (see picture 1)

By pressing key "b", it is possible at all times to exit another function and to return to time of day mode (see picture 4a). Subsequent actuation of key "c" causes the display to return to the previous function.

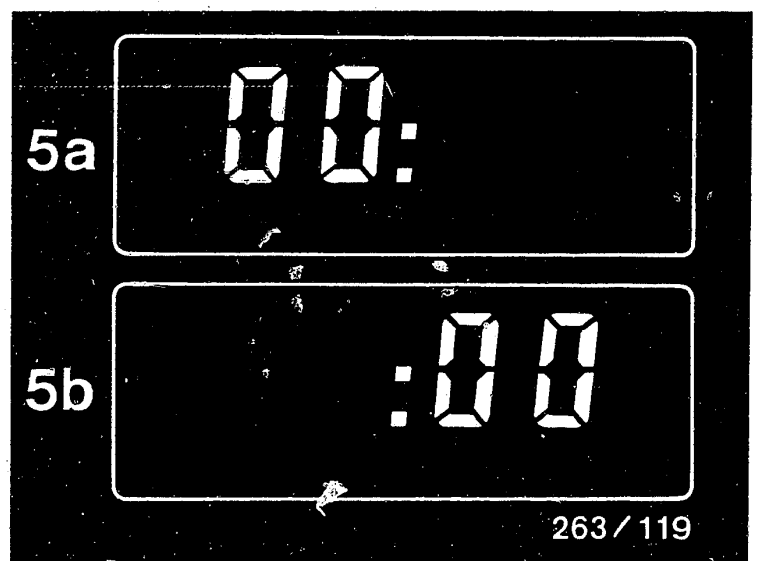
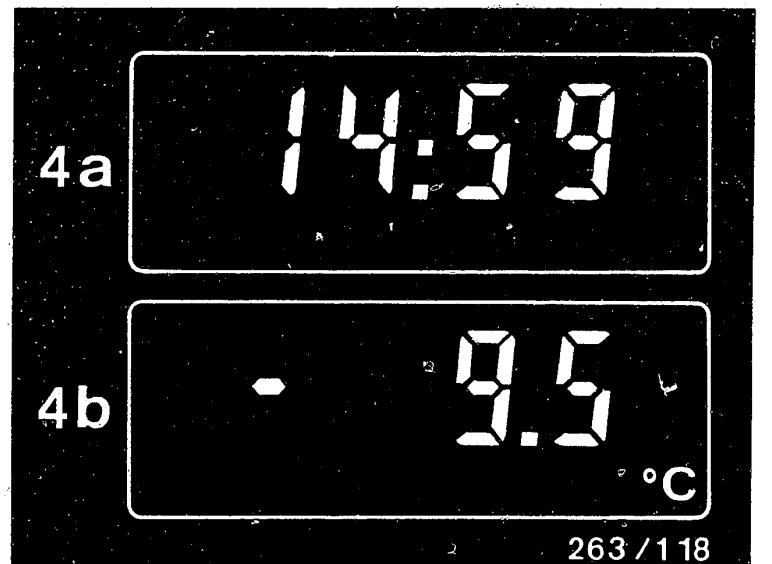
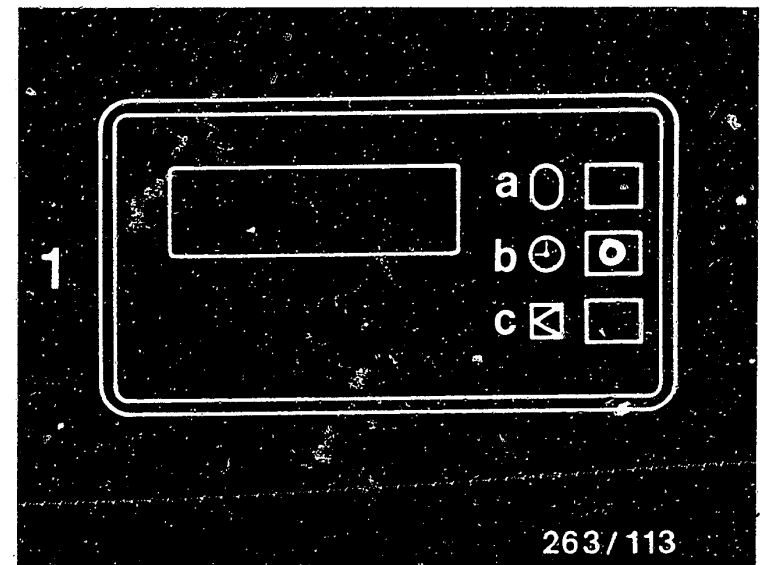
#### 7.1.5 Setting the time with keys "a" and "b"

Trip computer in "time of day" mode, ignition on.

First pressing of key "a" causes switching-off of the minutes display (see picture a). Subsequent brief pressing of key "b" advances the hours display by one unit; pressing for longer causes automatic fast advance. When key "a" is actuated a second time, this switches off the hours display (see picture 5b); setting of minutes with key "b" in same manner as for hours display.

The clock is started by pressing button "c" or "a" and likewise by switching off the ignition.

The dots between hours and minutes do not flash.



**B7**

Trouble-shooting (functional test)

Alfa Romeo, trip computer



**B8**

Trouble-shooting (functional test)

Alfa Romeo, trip computer



### 7.1.6 Calibration of range of tank with keys "b" and "c" (see top picture)

Assuming that each supplied trip computer is preset at a nominal voltage of the tank sender corresponding to a fuel quantity of 7 l, it is possible to make a further, more accurate calibration which compensates for the tolerances of the tank and of the tank sender.

This calibration is performed as follows:

- Contents of tank must be precisely 7 liters
- Ignition on (not important whether engine running)
- Simultaneously press key "b" and key "c" > 1 sec:  
trip computer is in "calibration mode" when 0 km appears on the display.
- By turning the calibration potentiometer (through hole in key "b", see bottom picture), set display to 65...70, corresponding to 7 liters in tank (see picture 6).

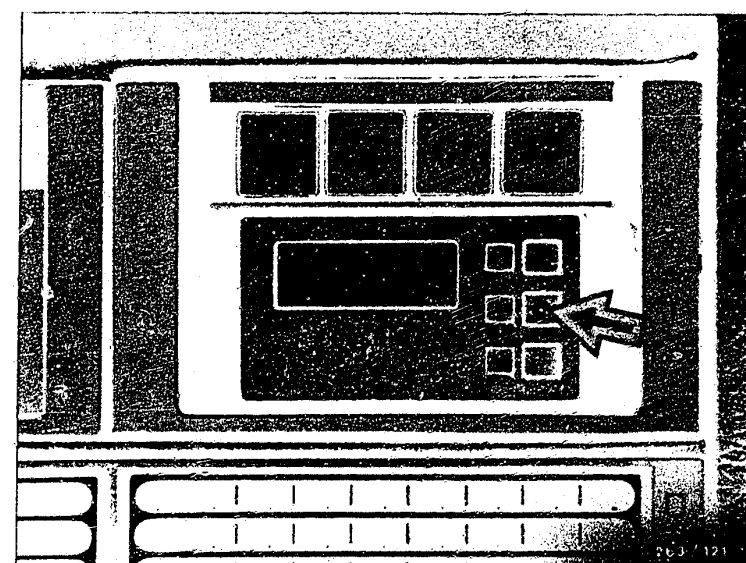
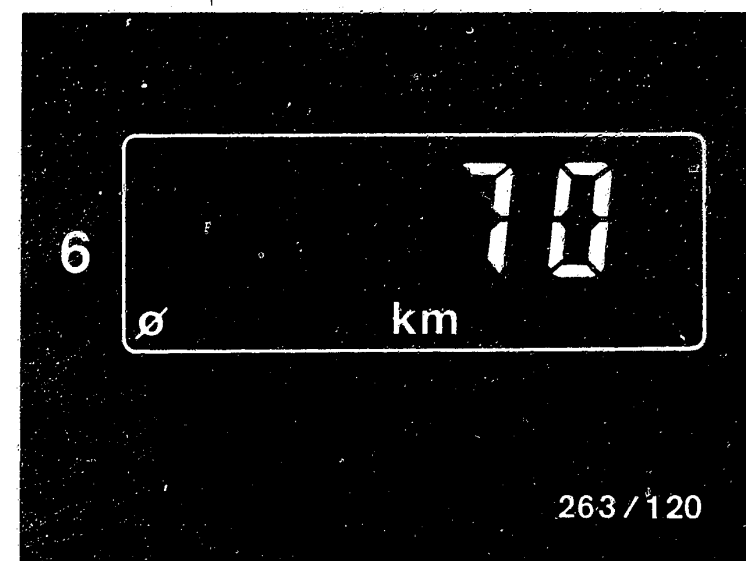
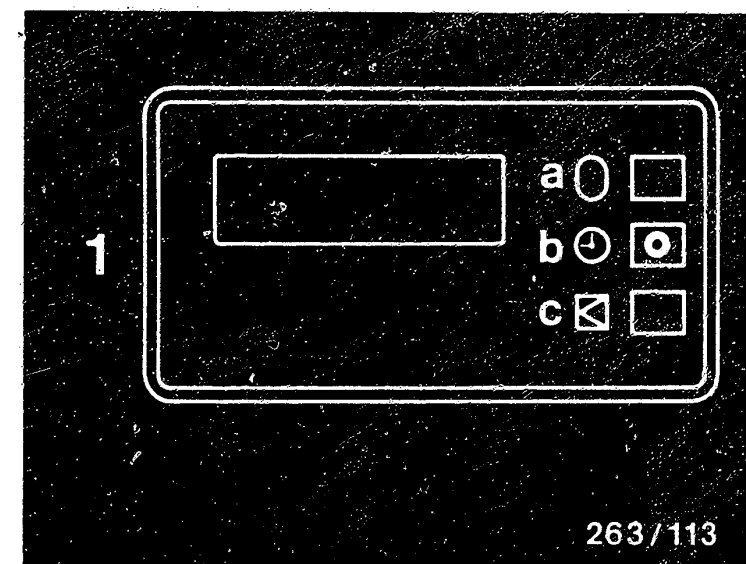
#### Note :

Potentiometer has a turning angle of max. 270°.

Turn carefully.

If previous range is known, the tank need not be emptied down to 7 l; the previous range can be set straight away at calibration potentiometer (in key "b"). Proceed in the same sequence as if 7 l in tank.

Calibration is completed when, after setting the above value, a different function is selected.



**B9**

Trouble-shooting (functional test)  
Alfa Romeo, trip computer



**B10**

Trouble-shooting (functional test)  
Alfa Romeo, trip computer



## 7.2 FUNCTIONS

### 7.2.1 Instantaneous consumption

Dimension changes depending on speed:

Display in l/h at below approx. 20 km/h (see picture 7a)

Display in l/100 km at above approx. 20 km/h (see picture 7b)

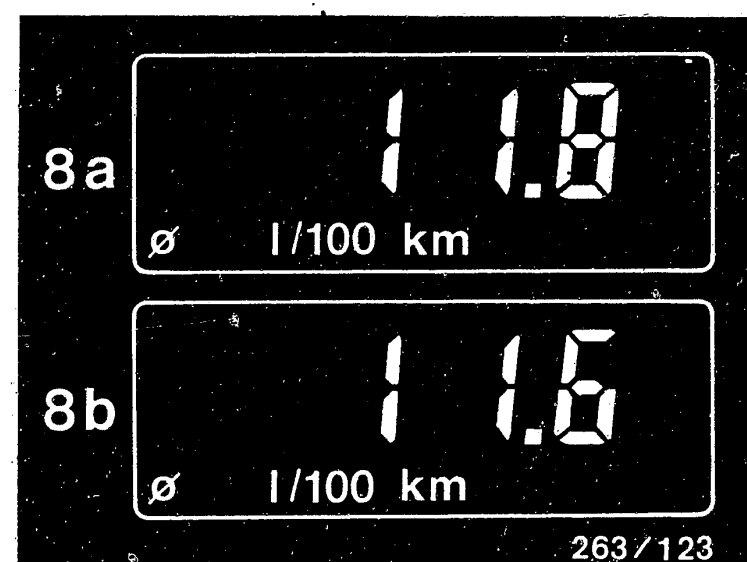
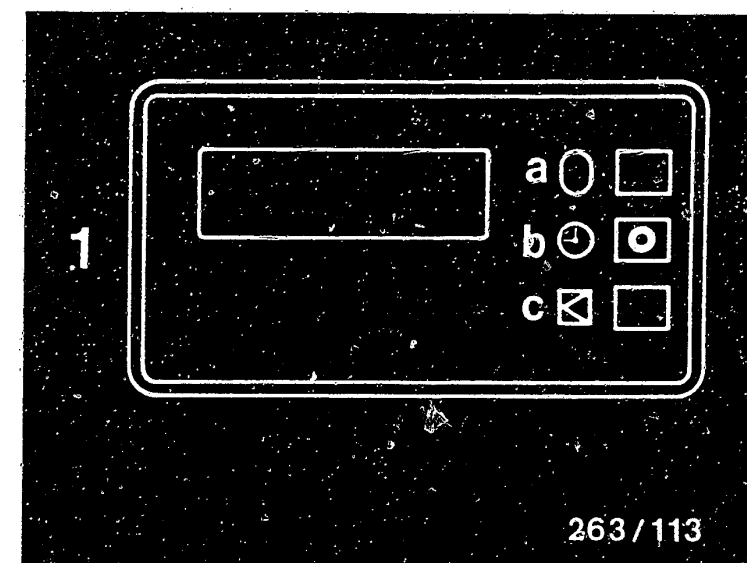
Max. indicated value: 40 l/h

On overrun cutoff the consumption display 0 is obtained in approx. 1 sec.

### 7.2.2 Average consumption

Display in Ø l/100 km

With the engine running and the vehicle stationary, the display shows the last indicated average value for when the vehicle was moving (see picture 8a). Immediately after the vehicle has been stopped, the reading may change once again due to the software as the last distance pulse is measured (see picture 8b).



**B11**

Trouble-shooting (functional test)  
Alfa Romeo, trip computer



**B12**

Trouble-shooting (functional test)  
Alfa Romeo, trip computer

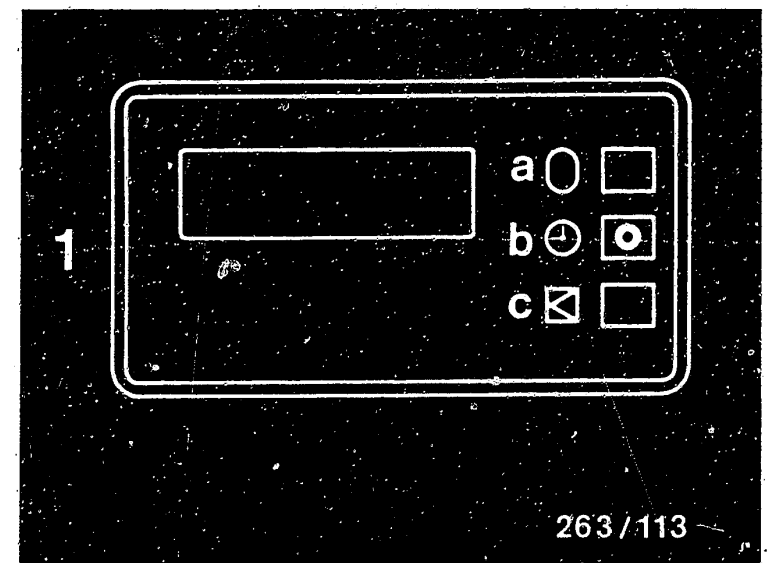


### 7.2.3 Average speed

The calculation of the average speed can be re-started at any time - e.g. at the start of a journey - by pressing key "a" (picture 1) for > 1 sec. After resetting, the display ---- appears for 1 sec (see picture 9a).

Interruptions in the journey with the ignition off are not included.

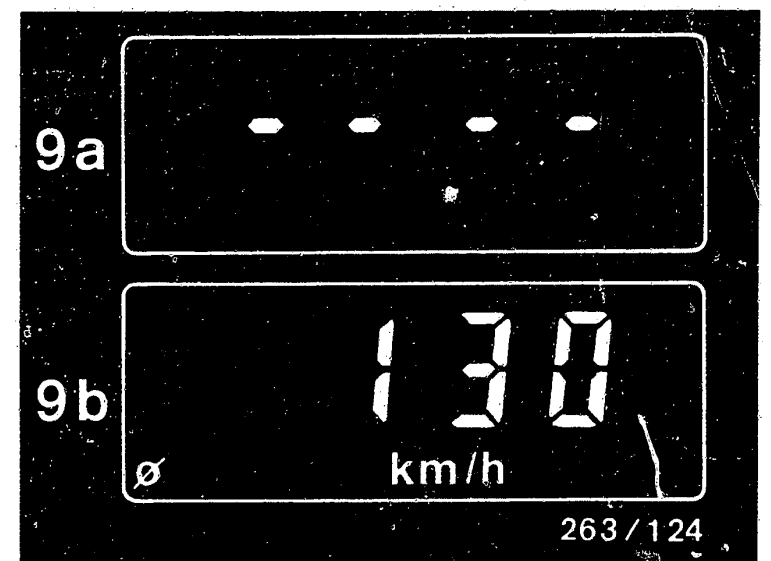
Display in ave. km/h (see picture 9b).



### 7.2.4 Range of tank (miles to empty) with tank contents greater than or equal to 46 - 6 l

46 l is the max. tank contents and 6 l the quantity of fuel which, starting out from a full tank, must be consumed for the tank sender to operate correctly.

If the tank contents are > 40 l, the range is indicated in the form H ... (see picture 10) whereby ... is the range which is calculated from a tank of 46 - 6 l and the calculated consumption over the last approx. 32 km at an average speed = approx. 60 km/h.



**B 13**

Trouble-shooting (functional test)  
Alfa Romeo, trip computer



**B 14**

Trouble-shooting (functional test)  
Alfa Romeo, trip computer



#### 7.2.4.1 Range of tank (miles to empty) with tank contents between 40 and 7 l

The range is calculated from the instantaneous tank level and the calculated consumption over the last approx. 32 km, at an average speed = approx. 60 km/h.

After refueling, there is an automatic correction of the range of the tank within approx. 10 min. The changed range can be made to appear immediately on the display by pressing key "a" for > 1 sec. In this case, 4 bars (see picture 11a) appear for approx. 3 sec, after which the changed range is indicated (see picture 11b).

Display in km.

#### 7.2.4.2 Range of tank (miles to empty) with tank contents between 7 and 3 l

The display switches automatically to "range of tank" if the tank contents are less than 7 l.

Display is in the form A ... whereby ... is the calculated range in km (see picture 12a).

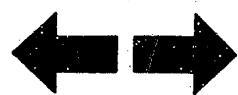
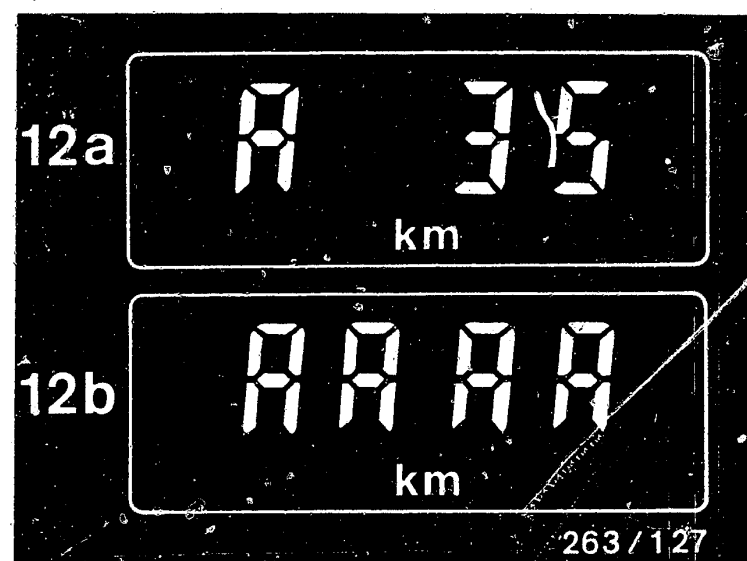
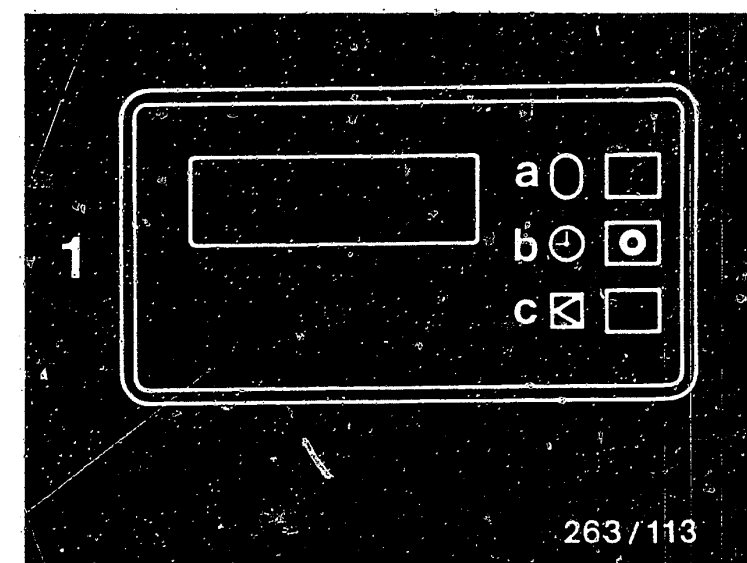
Display flashes.

This warning function is switched off by selecting a different function.

There is a renewed automatic change-over to "range of tank" (miles to empty) when the ignition is switched on again after having previously been switched off, i.e. after each interruption in the journey with the ignition off.

#### 7.2.4.3 Range of tank (miles to empty) with tank contents less than 3 l

There is no longer a numerical indication of the remaining range on the tank. Display flashes with AAAA (see picture 12b).



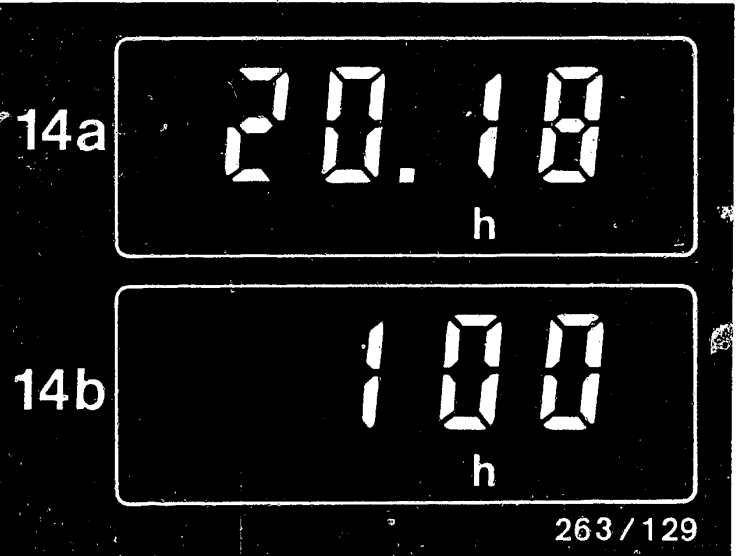
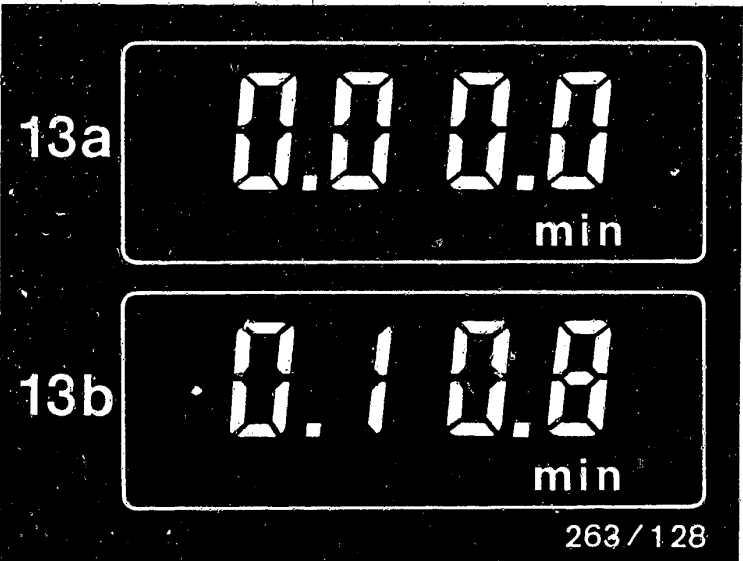
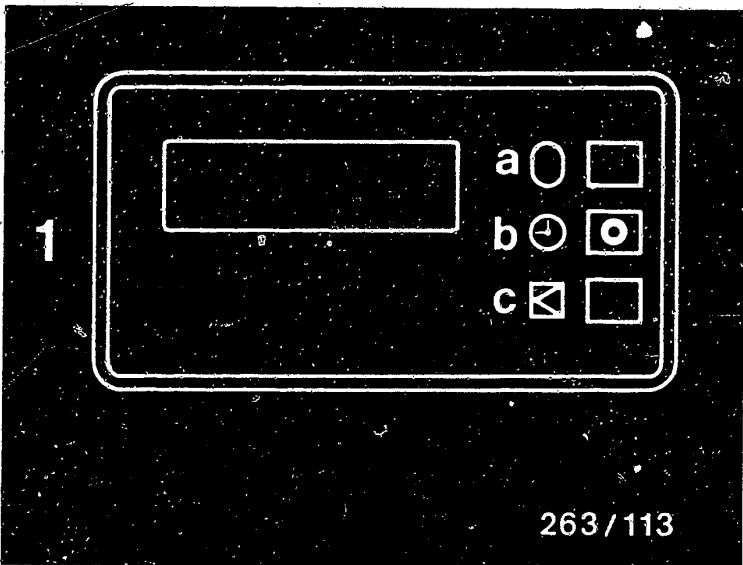
7.2.5 Stopwatch

Zero - Start - Stop - Zero ... by pressing key "a".

Stopwatch display:

Time	indicated figures signify				
up to 10 min	min	sec	sec	1/10 sec	(see picture 13a)
up to 60 min	min	min	sec	sec	(see picture 13b)
up to 100 h	hr	hr	min	min	(see picture 14a)
as of 100 h	hr	hr	hr	hr	(see picture 14b)

Stopwatch is stopped with ignition off.



### 7.2.6 Outside temperature

Display in °C in steps of 0.5° C (see picture 15a). If temperature falls below the 0°C limit, a minus sign (-) appears in front of the figures (see picture 15b).

### 7.3 TEST MODE

In addition to the agreed functions, it is possible to call up 3 additional measuring/test functions. This is done by simultaneously pressing the 3 keys with the ignition on.

The 3 functions appear sequentially in the following order.

#### 7.3.1 Display of program code

The 1st simultaneous pressing of the 3 keys > 1 sec causes the program code (e.g. 6.14) to be indicated (see picture 16a).

1st digit = ROM No.

2nd 3rd and 4th digits = Encoding of code pins.

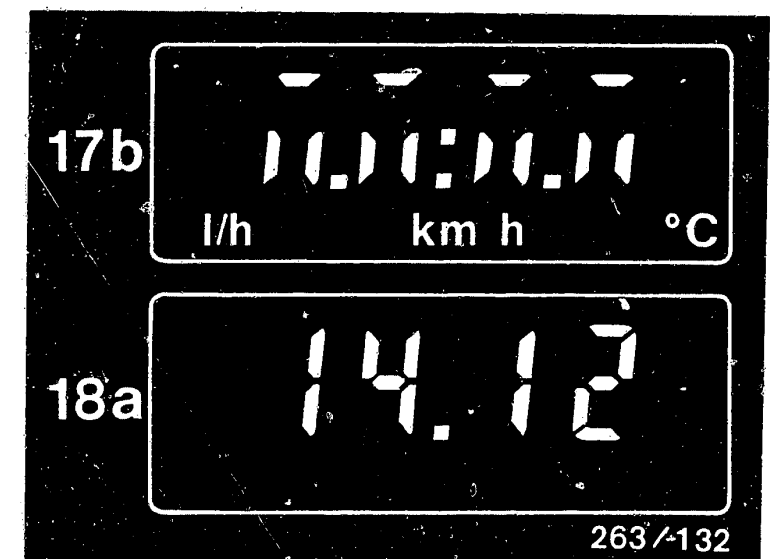
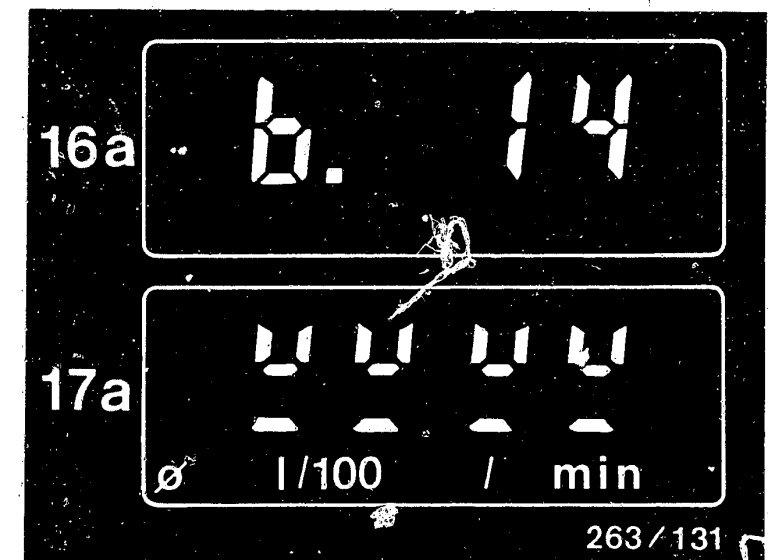
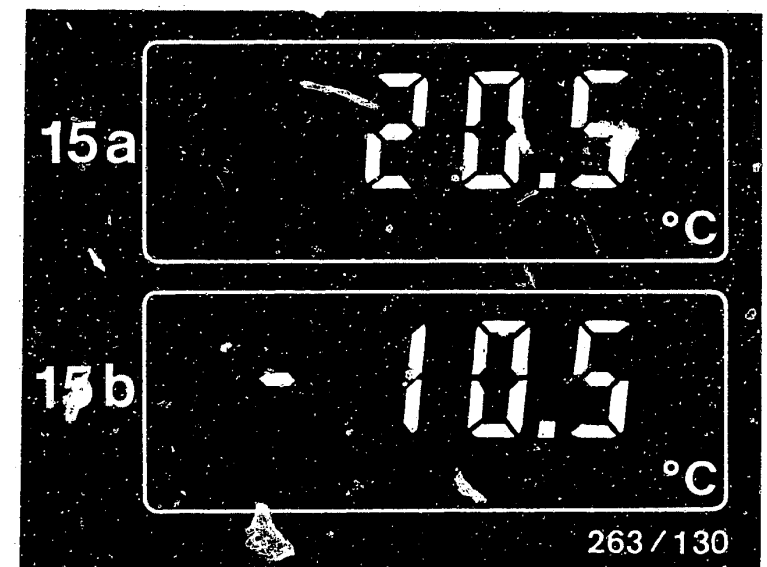
#### 7.3.2 Display test

The 2nd simultaneous pressing of the 3 keys > 1 sec causes all segments of the display to be tested alternately (see picture 17a, 17b).

#### 7.3.3 Indication of supply voltage

The 3rd simultaneous pressing of the 3 keys > 1 sec causes the supply voltage to be indicated (see picture 18a).

The test mode is exited by selecting any function.



**B 19**

Trouble-shooting (functional test)  
Alfa Romeo, trip computer



**B 20**

Trouble-shooting (functional test)  
Alfa Romeo, trip computer



Fault symptom (customer complaint)

- ## Causes of trouble

## Testing on Coordinates

●	●								No, or temporarily no battery voltage to trip computer	D5,D21
●	●				●	●		●	Trip computer defective, replace	C1...C4
		●	●	●	●		●	●	No connection at term. 15 or temporarily no voltage	D 21
		●		●	●			●	Controls defective, replace trip computer	C1...C4
			●						Connections or outside temperature sensor defective or damaged, encoded, incorrect installation position	D 23
				●					Tank sender defective, dent in fuel tank, no voltage at tank sender	C 8, C22, D13, E15
				●				●	Battery voltage too low, range-of-tank setting incorrect	D 5
				●					Tank sender defective	C8, C22, D13, E15
					●				Displacement sensor defective	D 9



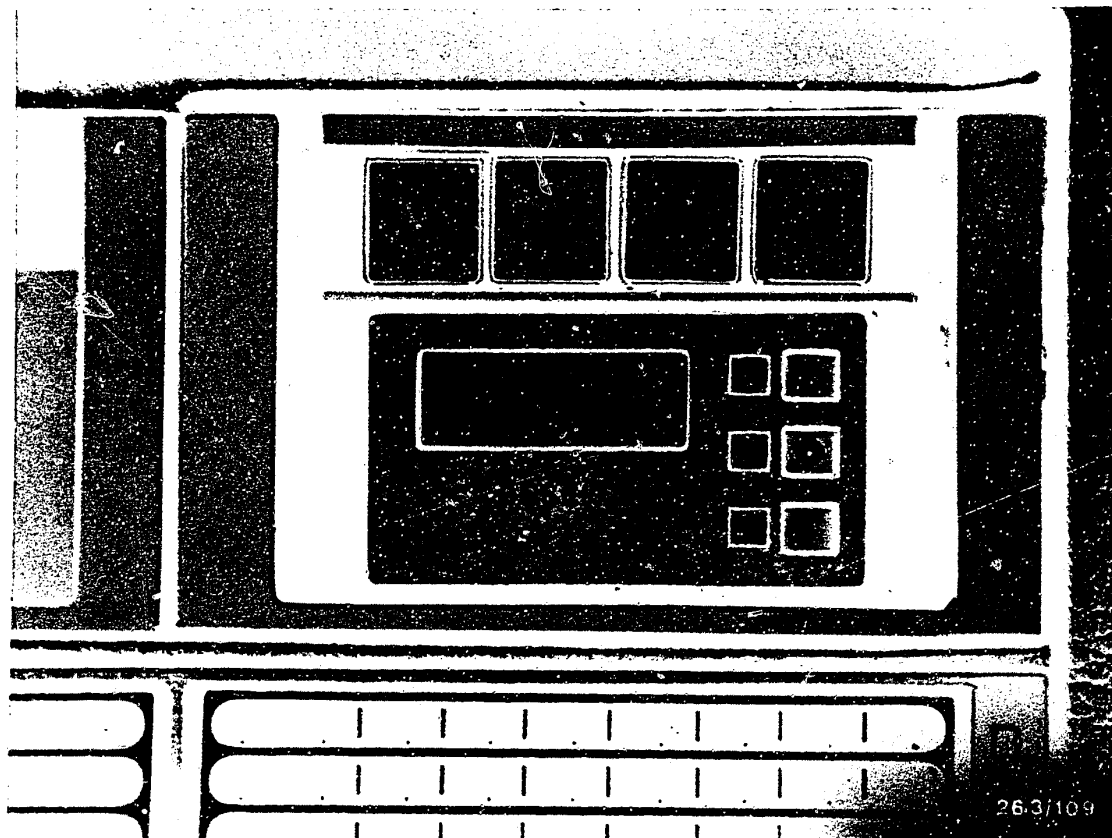
The fault symptoms listed below may be due to one or more faults.

1. No display on trip computer
2. Time of day incorrectly displayed
3. Time of day only - no other functions possible
4. No display of outside temperature
5. Range of tank (miles to empty) no display or display incorrect
6. Average speed - no display or display incorrect
7. Incomplete figures in display (segments only)
8. Figures on display only slightly visible
9. Consumption display incorrect
10. Illumination not working
11. Test function not working or showing incorrect values

**B 23**

**B 24**





1 = Trip computer

### 7.5 Removing the trip computer

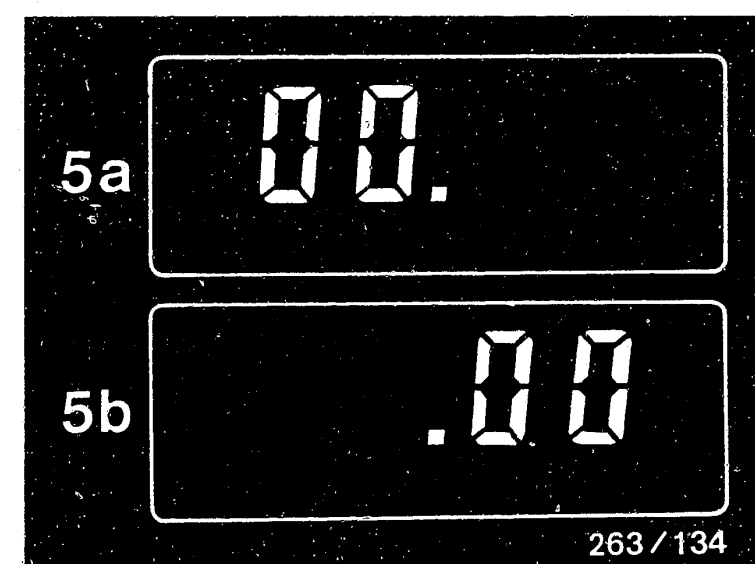
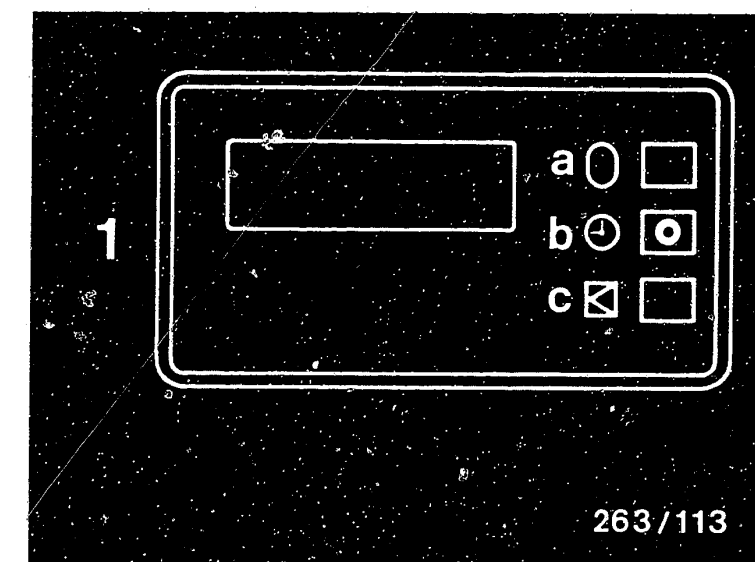
Using a screw-driver, slightly raise the frame for trip computer and indicator lamps at the edges and withdraw from instrument panel.

After replacing the trip computer, it is necessary to re-set the time of day and range of tank (miles to empty).



### 7.5.1 Setting the time with keys "a" and "b" (see top picture)

Trip computer in "time of day" mode, ignition on.  
First pressing of key "a" causes switching-off of the minutes display (see picture a). Subsequent brief pressing of key "b" advances the hours display by one unit; pressing for longer causes automatic fast advance. When key "a" is actuated a second time, this switches off the hours display (see picture 5b); setting of minutes with key "b" in same manner as for hours display.  
The clock is started by pressing button "c" or "a" and likewise by switching off the ignition.  
The dots between hours and minutes do not flash.



**C2**

Trouble-shooting  
Alfa Romeo, trip computer



**C3**

Trouble-shooting  
Alfa Romeo, trip computer



### 7.5.2 Calibration of range of tank with keys "b" and "c" (see top picture)

Assuming that each supplied trip computer is preset at a nominal voltage of the tank sender corresponding to a fuel quantity of 7 l, it is possible to make a further, more accurate calibration which compensates for the tolerances of the tank and of the tank sender.

This calibration is performed as follows:

- Contents of tank must be precisely 7 liters
- Ignition on (not important whether engine running)
- Simultaneously press key "b" and key "c" > 1 sec:  
trip computer is in "calibration mode" when 0 km appears on the display.
- By turning the calibration potentiometer (through hole in key "b", see bottom picture), set display to 65...70, corresponding to 7 liters in tank (see picture 6).

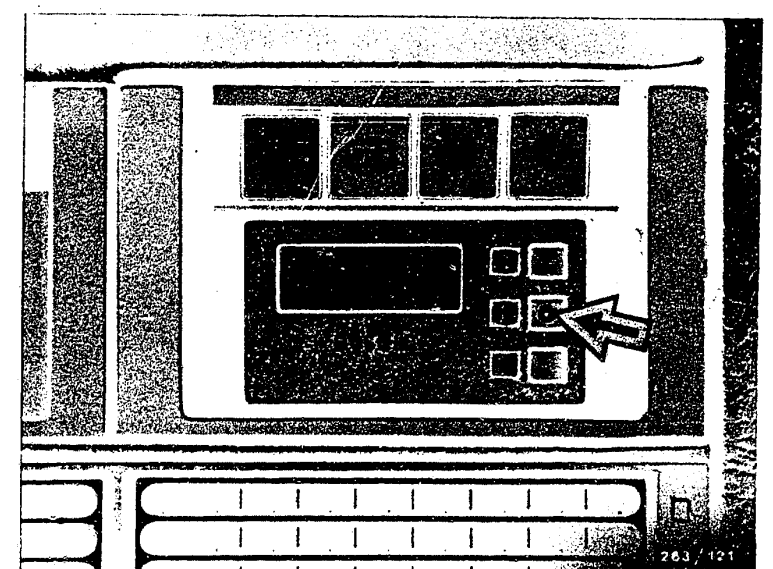
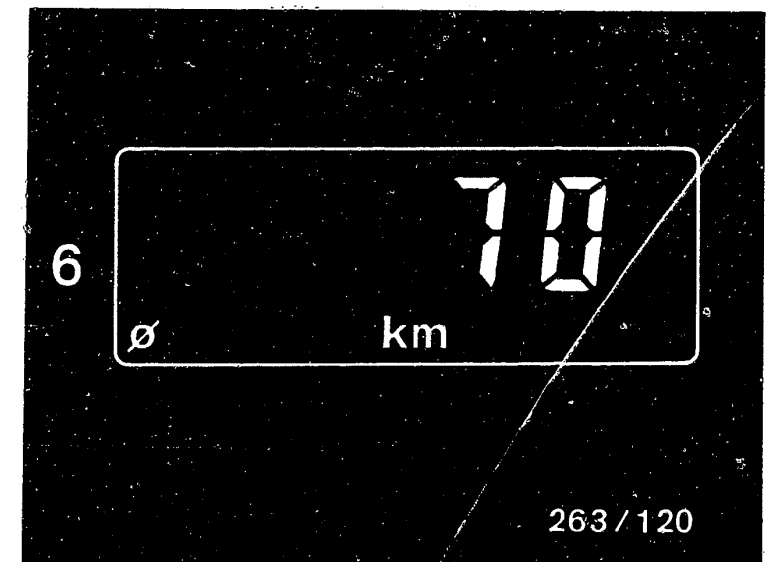
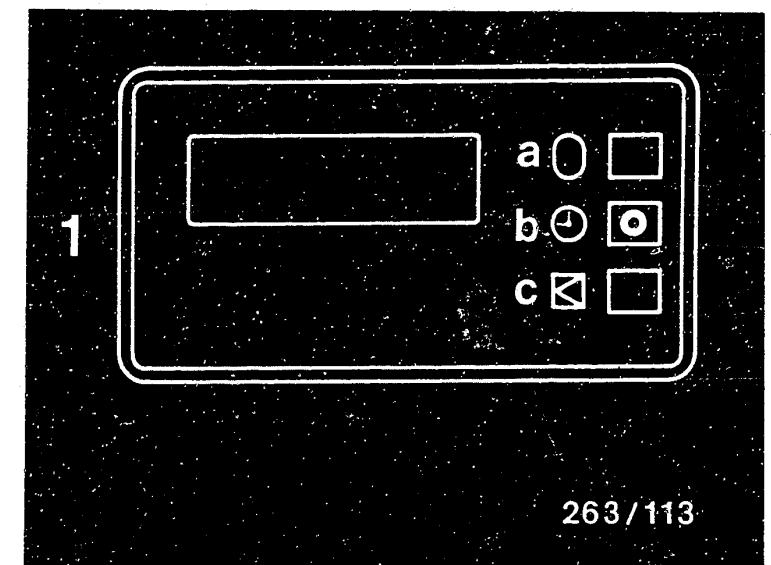
#### Note :

Potentiometer has a turning angle of max. 270°.

Turn carefully.


If previous range is known, the tank need not be emptied down to 7 l; the previous range can be set straight away at calibration potentiometer (in key "b"). Proceed in the same sequence as if 7 l in tank.

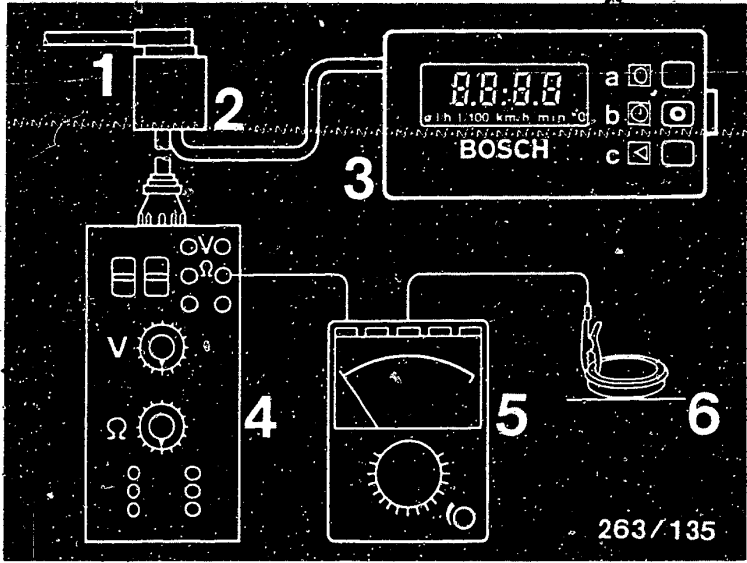
Calibration is completed when, after setting the above value, a different function is selected.



7.6 Test with universal test adapter

Test step: 1

Operation		Reading	Testing
<u>Program switch "V"</u> <u>at position:</u>		On multimeter:  0...10 Ω   If reading O.K., continue testing with <u>next test step</u> .	<u>Components:</u> Lead from central ground to trip computer  Pin 1
<u>Program switch "Ω"</u> <u>at position:</u>			
<u>Measuring equipment:</u> Multimeter (Ω range)			<u>Operation:</u> Resistance measurement Continuity
<u>Measuring range:</u> Ω x 1			
<u>Connection:</u> Test sockets blue			
<u>Operation in vehicle:</u>  _____			<u>Malfunction:</u> <u>Reading</u> ≠ Ω



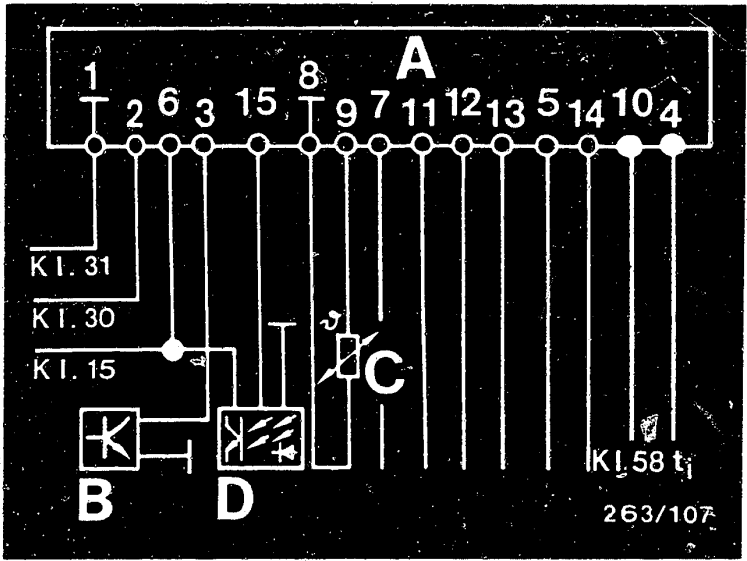
- 1 = 15-pin plug on vehicle wiring harness  
2 = Adapter lead  
3 = Trip computer  
4 = Universal test adapter  
5 = Multimeter  
6 = Cigarette lighter

Note: For this measurement, use only 1 Ω socket on uni adapter (see picture).

Possible faults:

Open circuit/contact resistance in lead between pin 1 on trip computer plug (15-pin) and central ground.

Eliminate open circuit / contact resistance.



C6

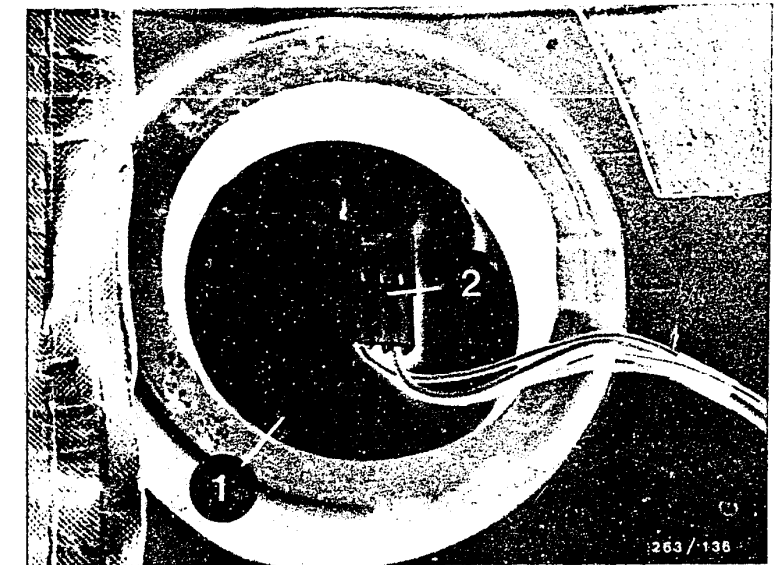
Test with universal test adapter  
Alfa Romeo, trip computer



C7

Test with universal test adapter  
Alfa Romeo, trip computer





1 = Tank sender  
2 = Plug

<u>Test step 2</u> (not applicable for Alfa 90 with Motronic, pin 5 is not occupied)			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> at position:	↓	On multimeter: approx. 0 ... 345 Ω	<u>Component:</u> Tank sender internal resistance
<u>Program switch "Ω"</u> at position	6		
<u>Measuring equipment:</u> Multimeter (Ω - range)			<u>Operation:</u> Resistance measurement
<u>Measuring range:</u> Ω x 1			
<u>Connection:</u> Blue test sockets			
<u>Operation in vehicle:</u> Plug of adapter lead dis- connected from trip computer		If reading O.K., continue testing with <u>next test step.</u>	<u>Malfunction:</u> Reading > 345 Ω

Possible faults:

Tank sender defective - replace.

Note: Before removing the tank sender, read off tank range on trip computer since,  
after replacing the tank sender, it is necessary to re-set the tank range.

**C8**

Test with universal test adapter  
Alfa Romeo, trip computer



**C9**

Test with universal test adapter  
Alfa Romeo, trip computer



### Calibration of range of tank with keys "b" and "c" (see top picture)

Assuming that each supplied trip computer is preset at a nominal voltage of the tank sender corresponding to a fuel quantity of 7 l, it is possible to make a further, more accurate calibration which compensates for the tolerances of the tank and of the tank sender.

This calibration is performed as follows:

- Contents of tank must be precisely 7 liters
- Ignition on (not important whether engine running)
- Simultaneously press key "b" and key "c" > 1 sec:  
trip computer is in "calibration mode" when 0 km appears on the display.
- By turning the calibration potentiometer (through hole in key "b", see bottom picture), set display to 65...70, corresponding to 7 liters in tank (see picture 6).

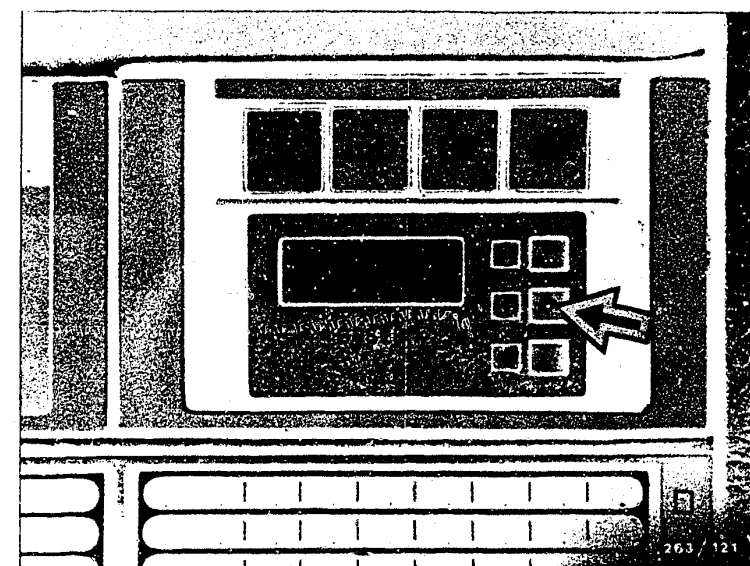
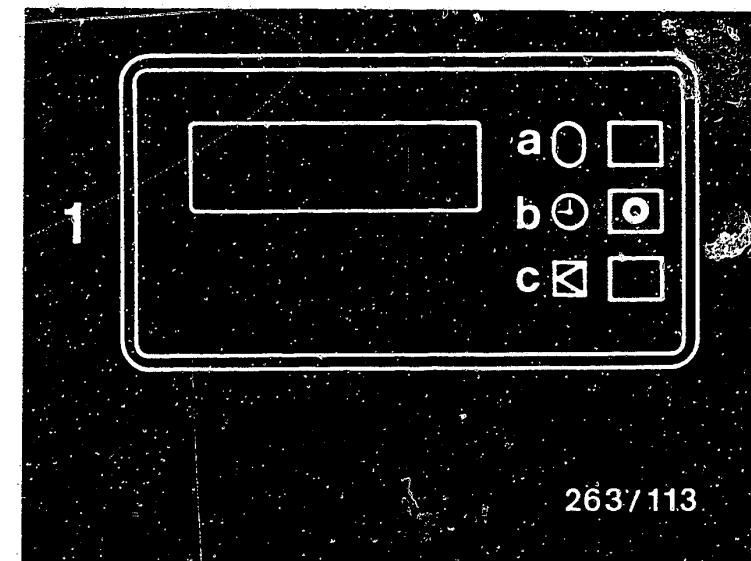
### N o t e :

Potentiometer has a turning angle of max. 270°.

Turn carefully.

If previous range is known, the tank need not be emptied down to 7 l; the previous range can be set straight away at calibration potentiometer (in key "b"). Proceed in the same sequence as if 7 l in tank.

Calibration is completed when, after setting the above value, a different function is selected.



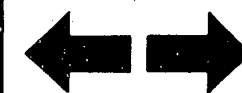
**C10**

Test with universal test adapter  
Alfa Romeo, trip computer



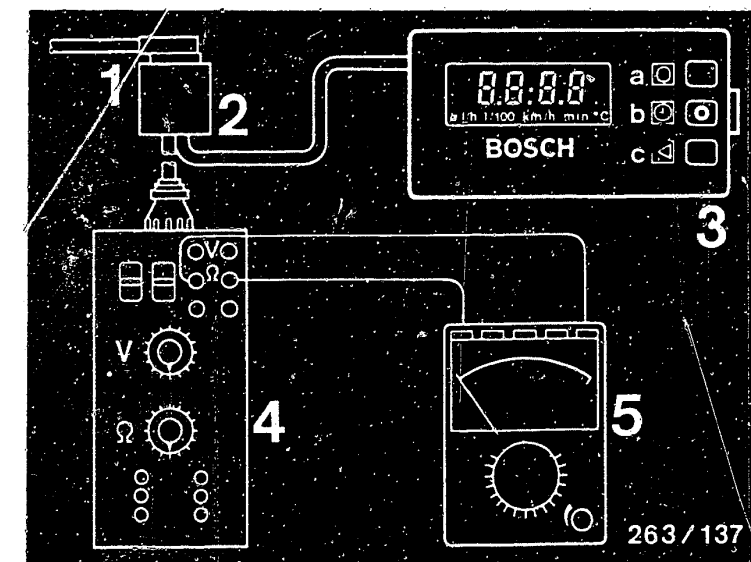
**C11**

Test with universal test adapter  
Alfa Romeo, trip computer



Test step 3 (not applicable for Alfa 90 with L-Jetronic/CEM\*/Motronic, pin 7 not occupied)

<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> at position:	↓	On multimeter:  > 10 000 Ω  <	



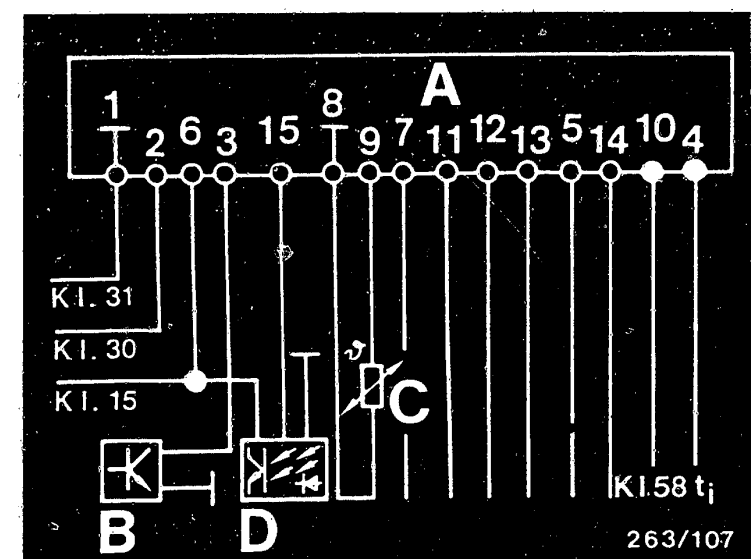
- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

#### Possible faults:

Open circuit/contact resistance in lead between pin 7 on trip computer plug and ground connection (central ground).

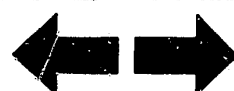
Eliminate open circuit / contact resistance.

\* CEM = Motronic of Italian origin



**C12**

Test with universal test adapter  
Alfa Romeo, trip computer




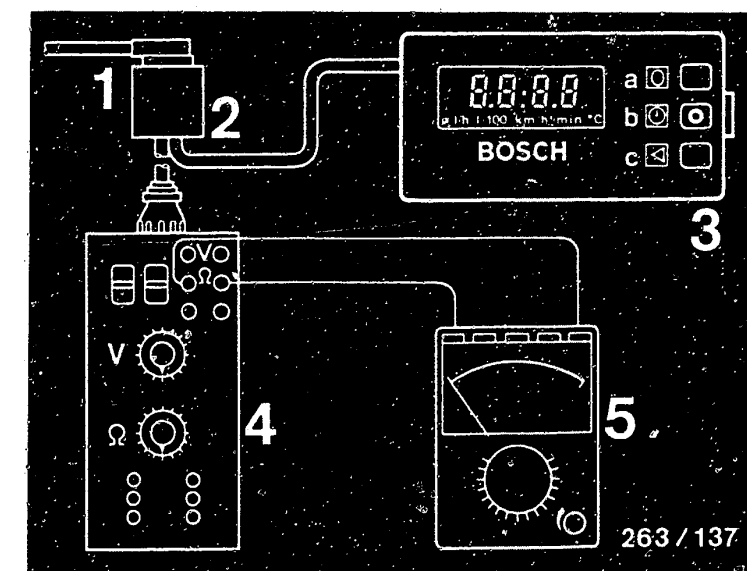
**C13**

Test with universal test adapter  
Alfa Romeo, trip computer





Test step 4		Reading	Testing
Operation			
<u>Program switch "V" at position:</u>		On multimeter:  approx. 0 ... 10 Ω	<u>Components:</u>  Ground lead between outside temperature sensor (c) and trip computer (A) pin 8
<u>Program switch "Ω" at position</u>	8		
<u>Measuring equipment:</u>  Multimeter (Ω - range)		If reading O.K., continue testing with <u>next test step.</u>	<u>Operation:</u>  Resistance measurement continuity
<u>Measuring range:</u>  Ω x 1			
<u>Connection:</u>  Blue test sockets			<u>Malfunction:</u>  Reading ∞ Ω
<u>Operation in vehicle:</u>  Trip computer plug disconnected			

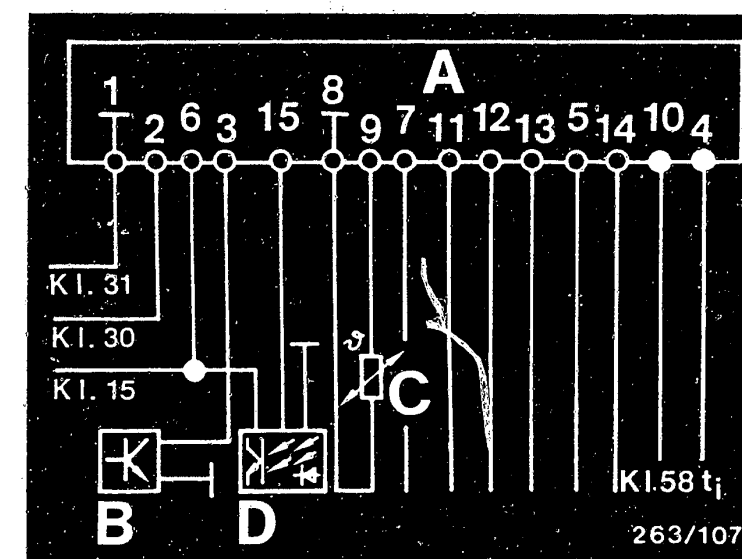


- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

#### Possible faults:

Open circuit/contact resistance in lead between outside temperature sensor and trip computer plug pin 8.

Eliminate open circuit/contact resistance.



**C14**

Test with universal test adapter  
Alfa Romeo, trip computer

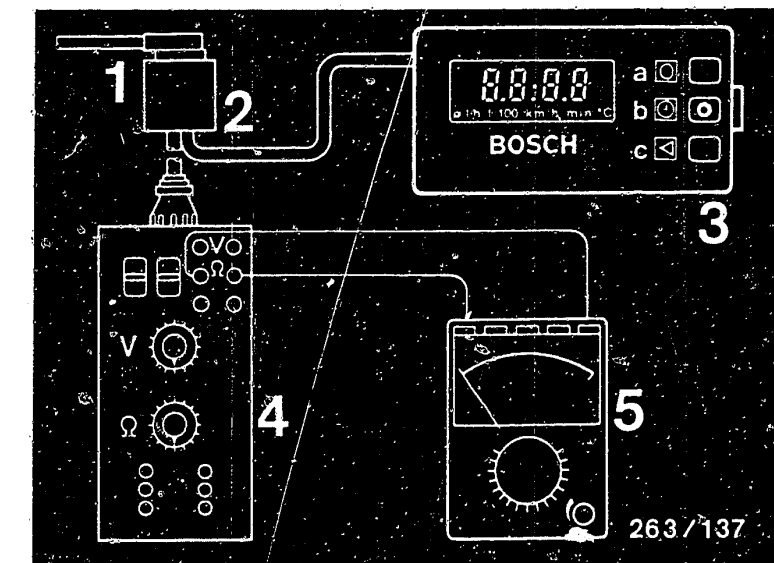


**C15**

Test with universal test adapter  
Alfa Romeo, trip computer



Test step 5 (not applicable for Alfa 90 with L-Jetronic/Motronic, pin 11 not occupied)		
Operation		Reading
Program switch "V" at position:	↓	On multimeter: > 10 000 Ω
Program switch "Ω" at position	11	
Measuring equipment:		If reading C.K., continue testing with next test step.
Multimeter (Ω - range)		
Measuring range:		Operation: Resistance measurement from pin 11 → pin 1 (ground)
Ω x 1		
Connection:		
Blue test sockets		Malfunction: Reading ∞ Ω
Operation in vehicle:		
Trip computer plug disconnected		

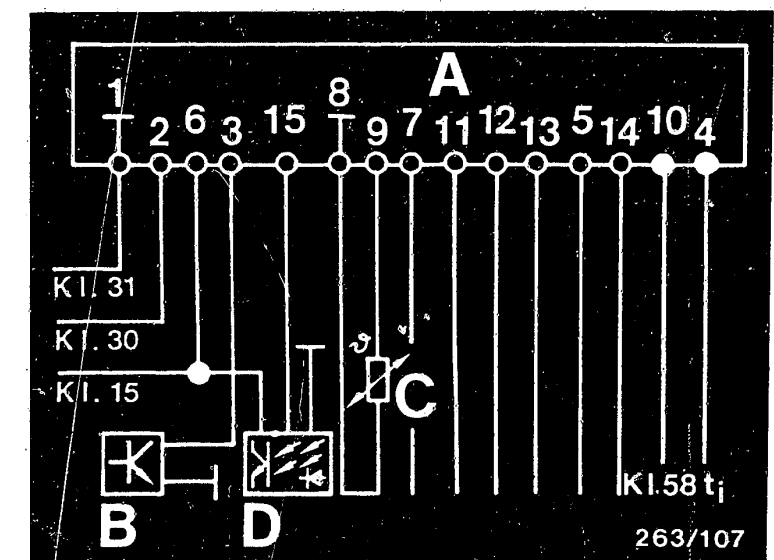


- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

#### Possible faults:

Open circuit/contact resistance in lead between pin 11 on trip computer plug and ground connection (central ground).

Eliminate open circuit / contact resistance.



**C16**

Test with universal test adapter  
Alfa Romeo, trip computer

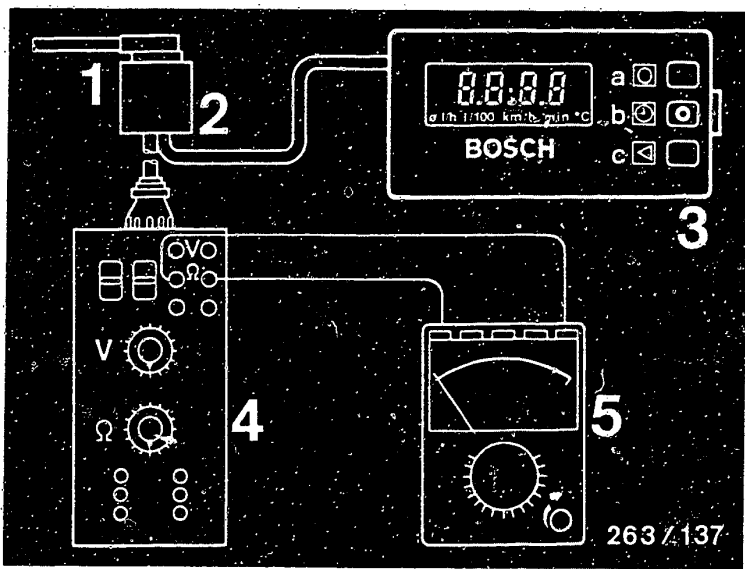


**C17**

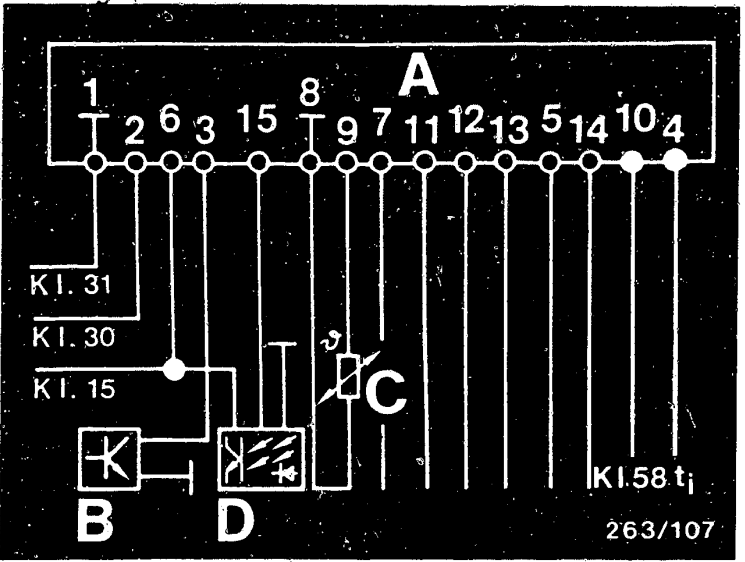
Test with universal test adapter  
Alfa Romeo, trip computer



Test step 6 (not applicable for Alfa 90 with L-Jetronic/CEM*, pin 12 not occupied).		
Operation	Reading	Testing
<div>Program switch "V" at position:</div> <div>Program switch "Ω" at position</div> <div>Measuring equipment:</div> <div>Multimeter (Ω - range)</div> <div>Measuring range:</div> <div>Ω x 1</div> <div>Connection:</div> <div>Blue test sockets</div> <div>Operation in vehicle:</div> <div>Trip computer plug disconnected</div>	<div>↓</div> <div>12</div> <div>On multimeter: &gt; 10 000 Ω</div> <div>If reading O.K., continue testing with next test step.</div>	<div>Component:</div> <div>Encoding lead 4</div> <div>Operation:</div> <div>Resistance measurement from pin 12 → pin 1 (ground)</div> <div>Malfunction:</div> <div>Reading ∞ Ω</div>



- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter



#### Possible faults:

Open circuit/contact resistance in lead between pin 12 on trip computer plug and ground connection (central ground).

Eliminate open circuit / contact resistance.

\* CEM = Motronic of Italian origin

**C18**

Test with universal test adapter  
Alfa Romeo, trip computer



**C19**

Test with universal test adapter  
Alfa Romeo, trip computer



Test step 7 (not applicable for Alfa 90 with L-Jetronic/CEM\*, pin 13 not occupied)

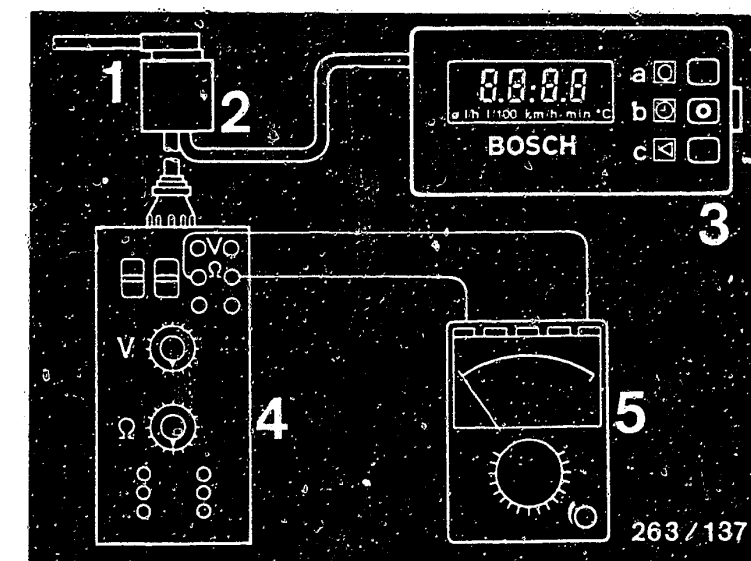
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> at position:	↓	On multimeter:  > 10 000 Ω   <	

#### Possible faults:

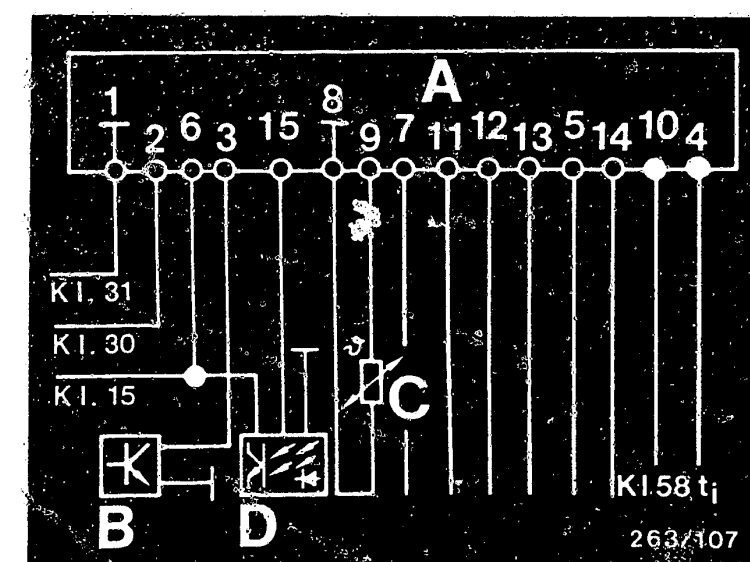
Open circuit/contact resistance in lead between pin 13 on trip computer plug and ground connection (central ground).

Eliminate open circuit / contact resistance.

\* CEM = Motronic of Italian origin

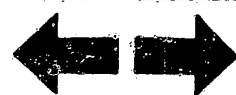


- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter



**C20**

Test with universal test adapter  
Alfa Romeo, trip computer

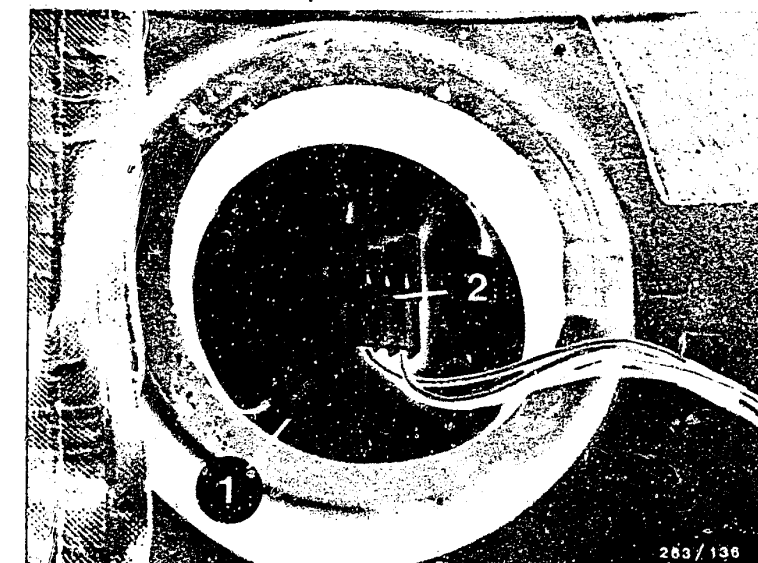


**C21**

Test with universal test adapter  
Alfa Romeo, trip computer



<u>Test step 8</u> (not applicable for Alfa 90 with L-Jetronic/CEM*/Motronic, pin 14 not occupied)		<u>Reading</u>	<u>Testing</u>
<u>Operation</u>			
<u>Program switch "V" at position:</u>	↓	On multimeter: 0 ... 345 $\Omega$  If reading O.K., continue testing with next test step.	<u>Component:</u> Tank sender internal resistance
<u>Program switch "<math>\Omega</math>" at position</u>	14		
<u>Measuring equipment:</u> Multimeter ( $\Omega$ - range)			<u>Operation:</u> Resistance measurement at tank sender.
<u>Measuring range:</u> $\Omega \times 1$			
<u>Connection:</u> Blue test sockets			<u>Malfunction:</u> Reading $\infty \Omega$
<u>Operation in vehicle:</u> Plug of adapter lead disconnected from trip computer			



1 = Tank sender  
2 = Plug

#### Possible faults:

Tank sender defective - replace.

Note: Before removing the tank sender, read off tank range on trip computer since, after replacing the tank sender, it is necessary to re-set the tank range.

\* CEM = Motronic of Italian origin

**C22**

Test with universal test adapter  
Alfa Romeo, trip computer



**C23**

Test with universal test adapter  
Alfa Romeo, trip computer



Calibration of range of tank with keys "b" and "c" (see top picture)

Assuming that each supplied trip computer is preset at a nominal voltage of the tank sender corresponding to a fuel quantity of 7 l, it is possible to make a further, more accurate calibration which compensates for the tolerances of the tank and of the tank sender.

This calibration is performed as follows:

- Contents of tank must be precisely 7 liters
- Ignition on (not important whether engine running)
- Simultaneously press key "b" and key "c" > 1 sec:  
trip computer is in "calibration mode" when 0 km appears on the display.
- By turning the calibration potentiometer (through hole in key "b", see bottom picture), set display to 65...70, corresponding to 7 liters in tank (see picture 6).

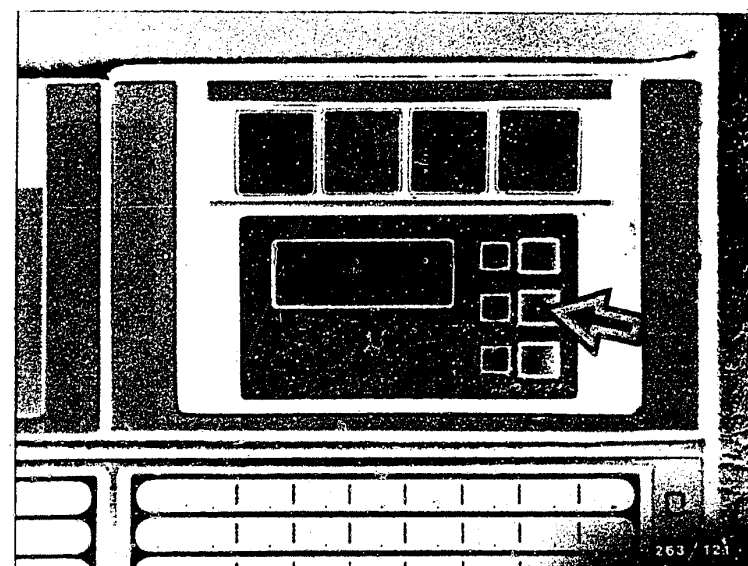
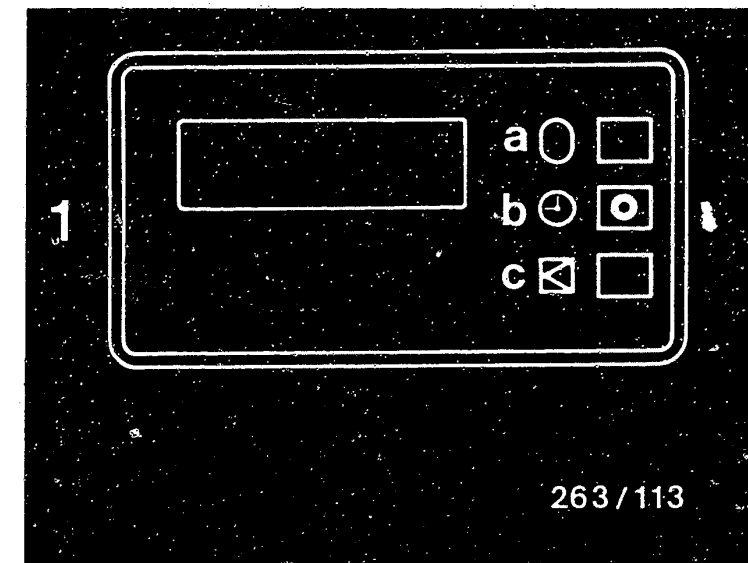
Note :

Potentiometer has a turning angle of max. 270°.

Turn carefully.

If previous range is known, the tank need not be emptied down to 7 l; the previous range can be set straight away at calibration potentiometer (in key "b"). Proceed in the same sequence as if 7 l in tank.

Calibration is completed when, after setting the above value, a different function is selected.



**D1**

Test with universal test adapter  
Alfa Romeo, trip computer



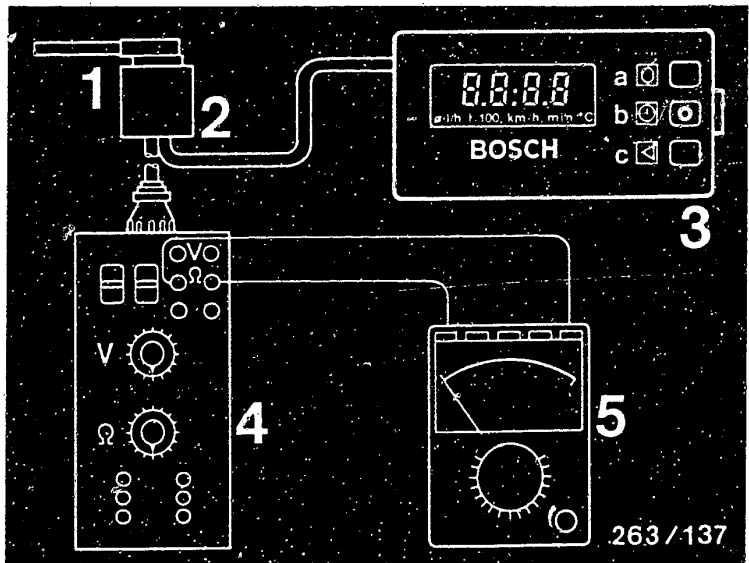
**D2**

Test with universal test adapter  
Alfa Romeo, trip computer



# Test step 9 (only for vehicles with carburetor engine)

Operation	Reading	Testing
<div>Program switch "V" at position:</div> <div>Program switch "Ω" at position:</div> <div>Measuring equipment:</div> <div>Multimeter (Ω - range)</div> <div>Measuring range:</div> <div>Ω x 1</div> <div>Connection:</div> <div>Blue test sockets</div> <div>Operation in vehicle:</div> <div>Adapter lead connected to trip computer. Ignition ON.</div>	<div>On multimeter:</div> <div>approx. 20 000 Ω</div> <div>If reading O.K., continue testing with next test step.</div>	<div>Component:</div> <div>Connection for flow sensor</div> <div>Operation:</div> <div>Resistance measurement from pin 15 → pin 6 (term. 15)</div> <div>Malfunction:</div> <div>Reading &lt; approx. 20 000 Ω</div> <div>or &gt; approx. 20 000 Ω</div>

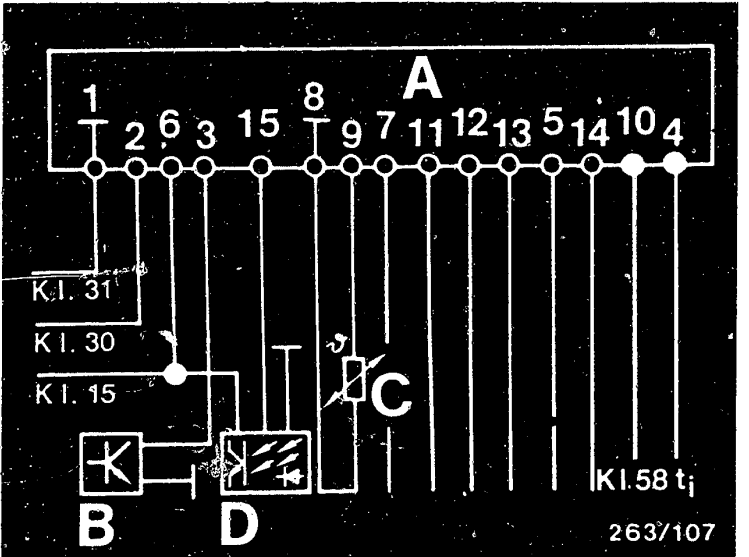


- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

## Possible faults:

Open circuit/contact resistance in lead between pin 15 on trip computer plug and flow sensor.

Eliminate open circuit / contact resistance.



D3

Test with universal test adapter  
Alfa Romeo, trip computer

←→

D4

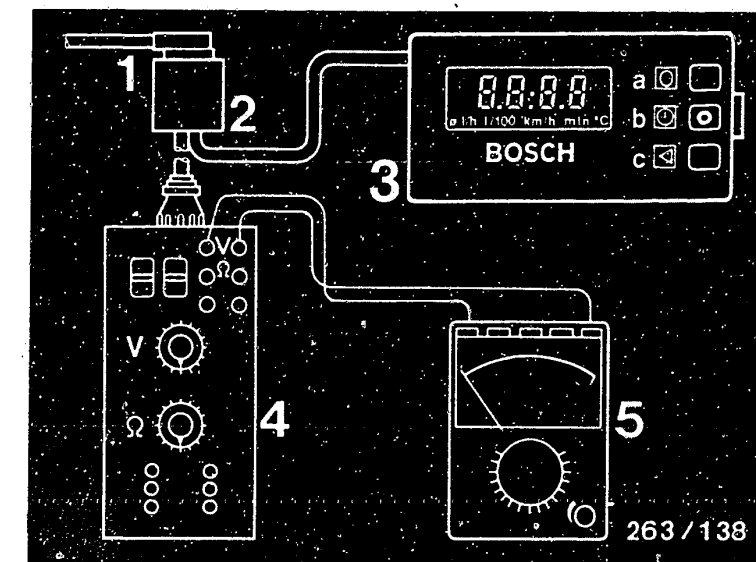
Test with universal test adapter  
Alfa Romeo, trip computer

←→

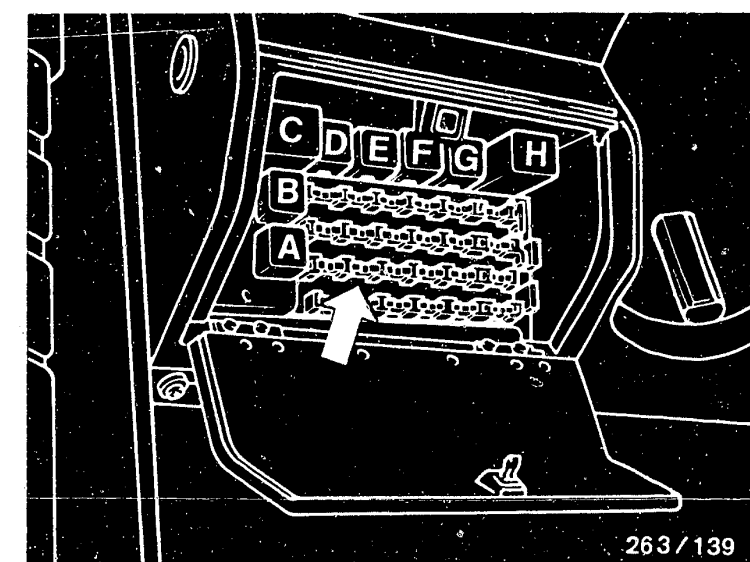
<u>Test step 10</u>			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> <u>at position:</u>	1	On multimeter: $V_{batt} \geq 12\text{ V}$	<u>Component:</u> Power supply to trip computer
<u>Program switch "Ω"</u> <u>at position:</u>	-		
<u>Measuring equipment:</u> Multimeter (V-range)		If reading O.K., continue testing with <u>next test step.</u>	<u>Operation:</u> Voltage measurement, continuity
<u>Measuring range:</u> 0 ... 15 V			
<u>Connection:</u> Red test sockets = positive Black test sockets = negative			<u>Malfunction:</u> No voltage or < 11.5 V
<u>Operation in vehicle:</u> -----			

#### Possible faults:

Open circuit/contact resistance in lead between term. 30 and trip computer pin 2.  
 Fuse No. 21 defective (see bottom picture, arrow).  
 Battery insufficiently charged.  
 Eliminate open circuit / contact resistance.  
 Replace defective fuse.  
 When fault remedied, re-set time.



- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter



**D5**

Test with universal test adapter  
 Alfa Romeo, trip computer



**D6**

Test with universal test adapter  
 Alfa Romeo, trip computer





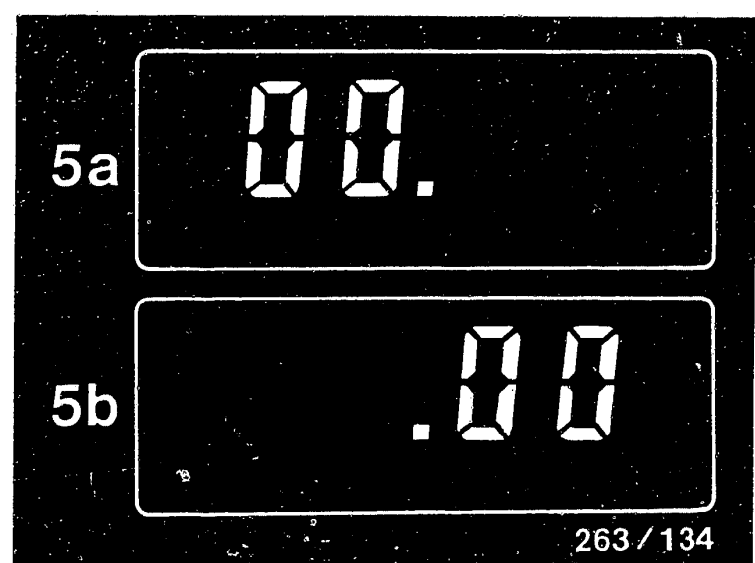
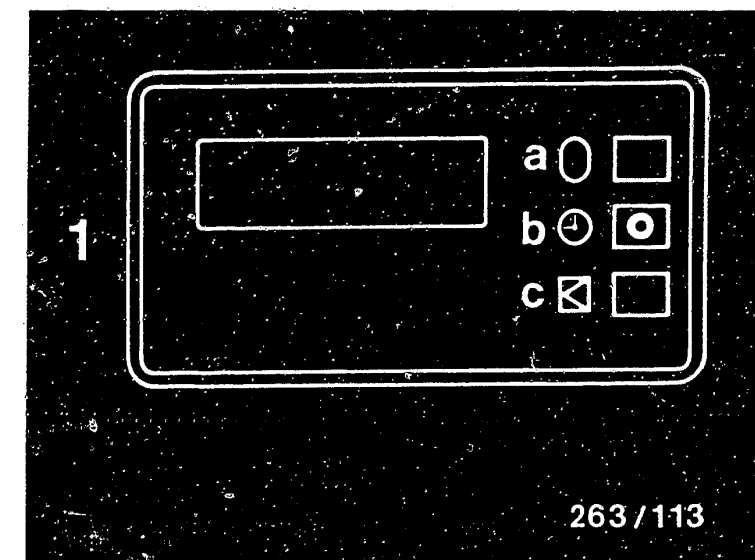
Setting the time with keys "a" and "b" (see top picture)

Trip computer in "time of day" mode, ignition on.

First pressing of key "a" causes switching-off of the minutes display (see picture a). Subsequent brief pressing of key "b" advances the hours display by one unit; pressing for longer causes automatic fast advance. When key "a" is actuated a second time, this switches off the hours display (see picture 5b); setting of minutes with key "b" in same manner as for hours display.

The clock is started by pressing button "c" or "a" and likewise by switching off the ignition.

The dots between hours and minutes do not flash.



**D7**

Trouble-shooting

Alfa Romeo, trip computer



**D8**

Trouble-shooting

Alfa Romeo, trip computer



<u>Test step 11</u>		<u>Reading</u>	<u>Testing</u>
<u>Operation</u>			
<u>Program switch "V"</u> <u>at position:</u>	2	On oscilloscope of motortester:	<u>Component:</u> Displacement sensor
<u>Program switch "Ω"</u> <u>at position:</u>	-	Oscilloscope pattern similar to the one shown (see top diagram in motortester)	
<u>Measuring equipment:</u> e.g. motortester MOT 201		$V_1 \leq 0.2 \text{ V}$ $V_2 \geq 7 \text{ V}$	<u>Operation:</u> Detecting on oscilloscope whether signal from dis- placement sensor is present.
<u>Measuring range:</u> -----			
<u>Connection:</u> Test wells on universal test adapter		If reading O.K., continue testing with <u>next test step.</u>	<u>Malfunction:</u> No oscilloscope pattern
<u>Operation in vehicle:</u> Engine running and drive wheels turning			

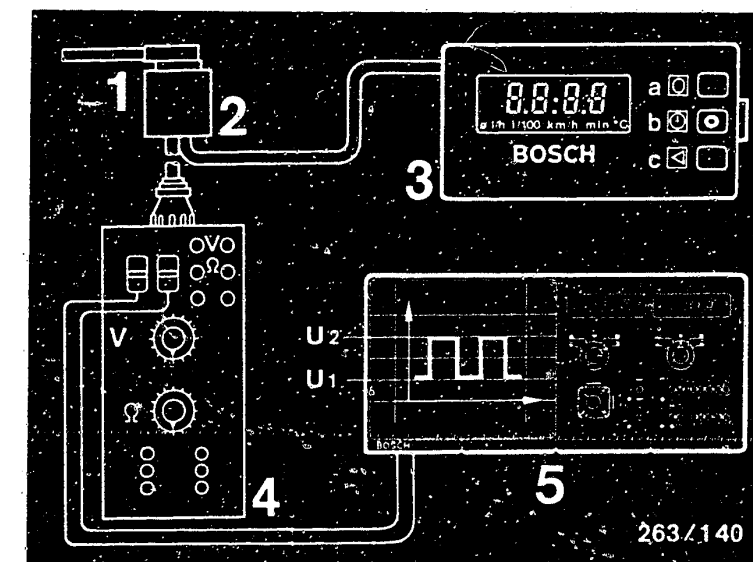
#### Possible faults:

Open circuit/contact resistance in lead between displacement sensor and trip computer pin 3.

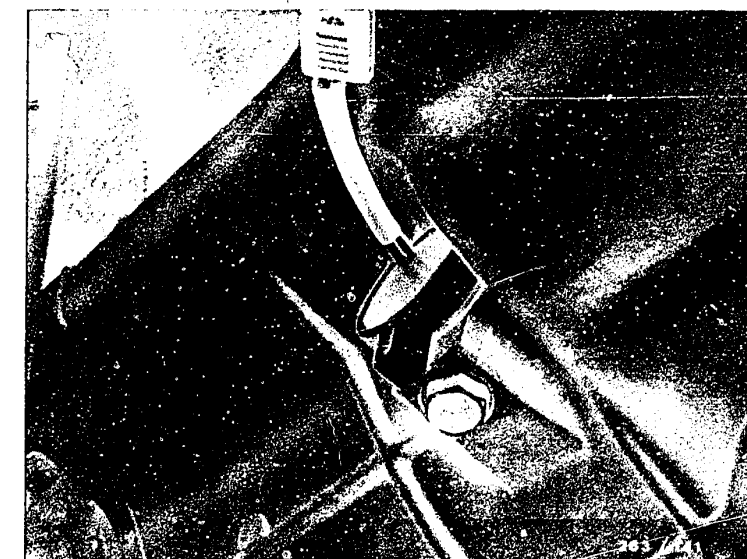
Displacement sensor defective (if odometer functioning).

Eliminate open circuit / contact resistance.

Replace displacement sensor in transmission housing (see bottom picture, arrow).



- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Motortester with oscilloscope



**D9**

Test with universal test adapter  
Alfa Romeo, trip computer

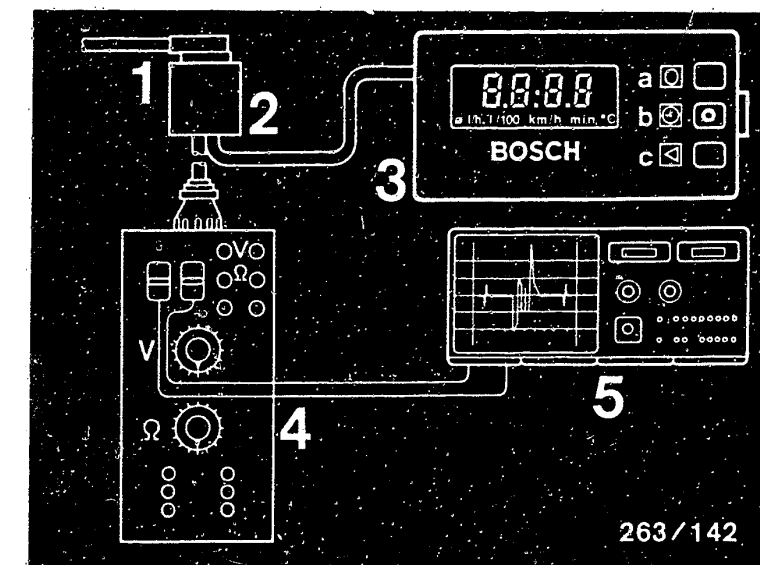


**D10**

Test with universal test adapter  
Alfa Romeo, trip computer



<u>Test step 12</u>		<u>Reading</u>	<u>Testing</u>
<u>Operation</u>			
<u>Program switch "V" at position:</u>	3	On oscilloscope of motortester:  Oscilloscope pattern similar to the one shown (see top diagram in motortester)  <	



- 1 = 15-pin plug on vehicle wiring harness  
2 = Adapter lead  
3 = Trip computer  
4 = Universal test adapter  
5 = Motortester with oscilloscope of  $t_i$  signal

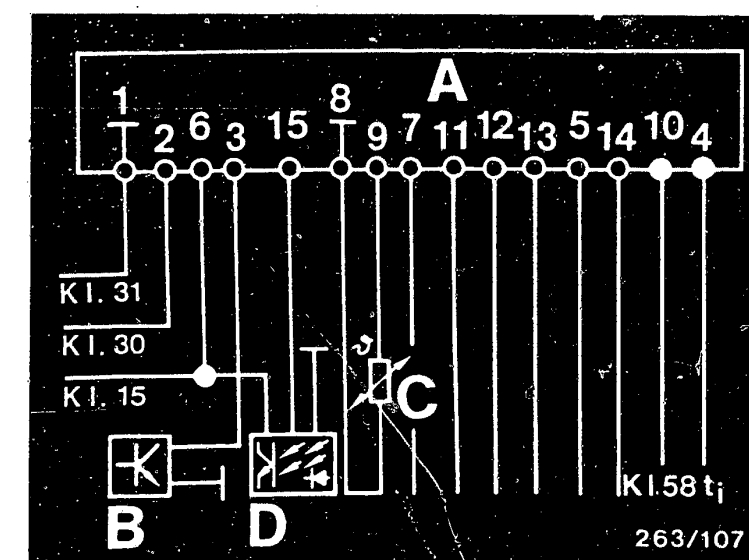
#### Possible faults:

Open circuit / contact resistance in plug connector / lead from L-Jetronic control unit to trip computer.

Using multimeter ( $\Omega$ ), check lead from L-Jetronic control unit (in firewall on right in front of front passenger) to trip computer pin 4 for continuity.

Reading should be =  $\infty \Omega$

Eliminate open circuit / contact resistance.



**D11**

Test with universal test adapter  
Alfa Romeo, trip computer



**D12**

Test with universal test adapter  
Alfa Romeo, trip computer



# Test 13 (not applicable for Alfa 90 with Motronic, pin 5 not occupied)

<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> <u>at position:</u>	4	On multimeter:  Tank full approx.0.5 V Tank 3/4 full approx.1.0 V Tank 1/2 full approx.1.5 V Tank 1/4 full approx.2.3 V Reserve tank approx.2.5 V Tank empty approx.2.7 V	<u>Component:</u>  Tank sender with lead
<u>Program switch "Ω"</u> <u>at position:</u>	-		
<u>Measuring equipment:</u>  Multimeter (V range)			
<u>Measuring range:</u>  0 ... 15 V			
<u>Connection:</u> Red test socket = positive Black test socket = negative			
		If reading O.K., continue testing with <u>next test step.</u>	<u>Operation:</u>  Voltage measurement
			<u>Malfunction:</u>  No reading or reading incorrect
<u>Operation in vehicle:</u>  Ignition ON		Plug connected to tank sender.	

## Possible faults:

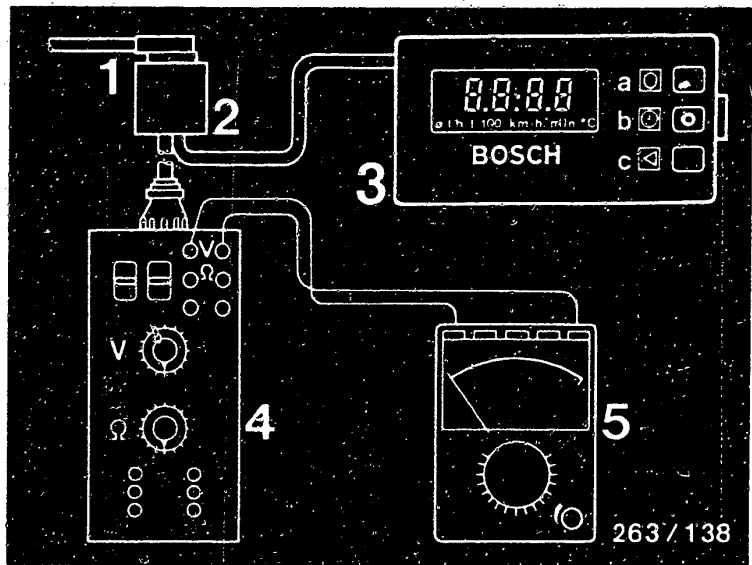
Tank sender defective or open circuit / contact resistance in lead between tank sender and trip computer pin 5.

Eliminate open circuit / contact resistance.

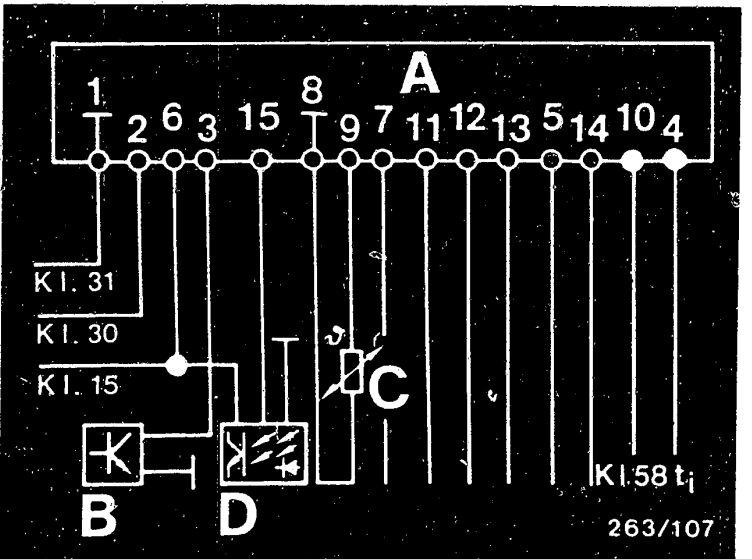
Replace defective tank sender / lead.

## Note:

After replacing the tank sender, it is necessary to re-set the tank range (miles to empty) on the trip computer.



- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter



D13

Test with universal test adapter  
Alfa Romeo, trip computer



D14

Test with universal test adapter  
Alfa Romeo, trip computer



### Calibration of range of tank with keys "b" and "c" (see top picture)

Assuming that each supplied trip computer is preset at a nominal voltage of the tank sender corresponding to a fuel quantity of 7 l, it is possible to make a further, more accurate calibration which compensates for the tolerances of the tank and of the tank sender.

This calibration is performed as follows:

- Contents of tank must be precisely 7 liters
- Ignition on (not important whether engine running)
- Simultaneously press key "b" and key "c" > 1 sec:  
trip computer is in "calibration mode" when 0 km appears on the display.
- By turning the calibration potentiometer (through hole in key "b", see bottom picture), set display to 65...70, corresponding to 7 l in tank (see picture 6).

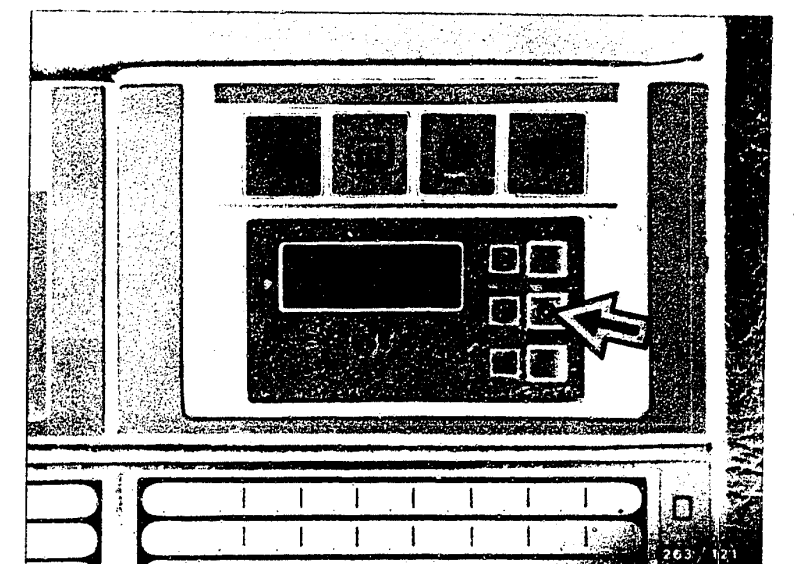
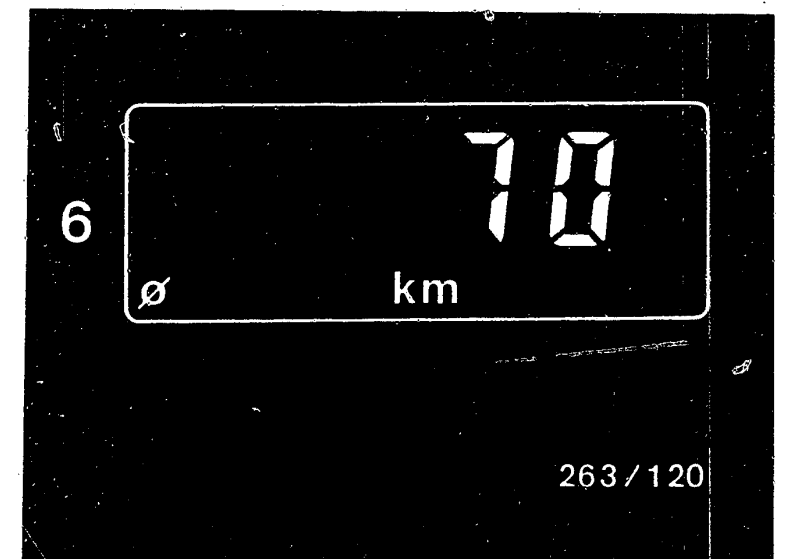
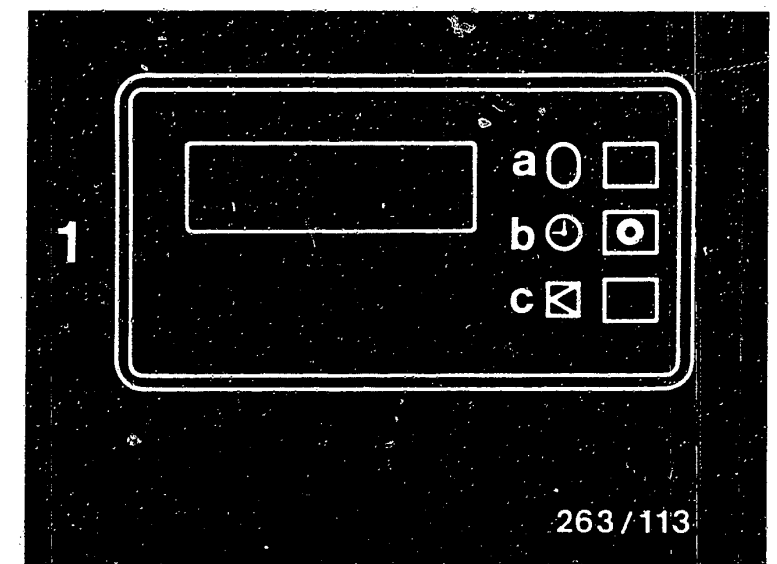
### Note :

Potentiometer has a turning angle of max. 270°.

Turn carefully.

If previous range is known, the tank need not be emptied down to 7 l; the previous range can be set straight away at calibration potentiometer (in key "b"). Proceed in the same sequence as if 7 l in tank.

Calibration is completed when, after setting the above value, a different function is selected.



**D15**

Test with universal test adapter  
Alfa Romeo, trip computer



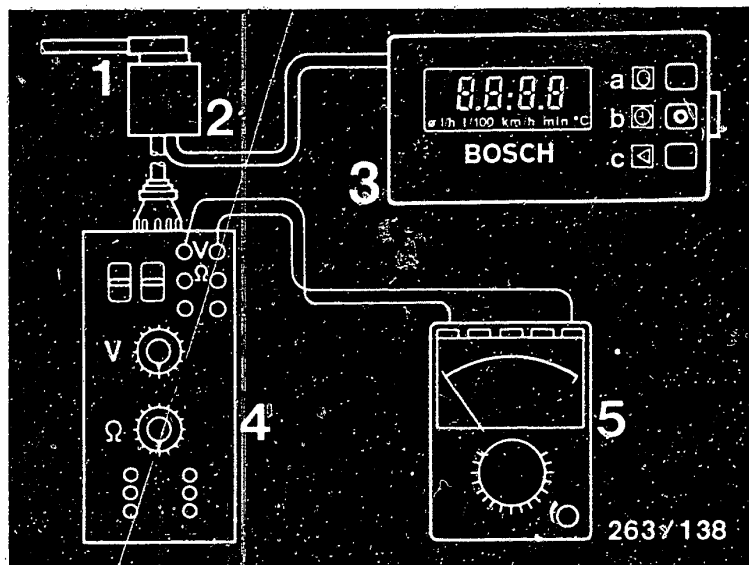
**D16**

Test with universal test adapter  
Alfa Romeo, trip computer



Test step 14 (not applicable for Alfa 90 with Motronic, pin 5 not occupied)

<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> <u>at position:</u>	4	On multimeter:  approx. 5 V  <	



- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

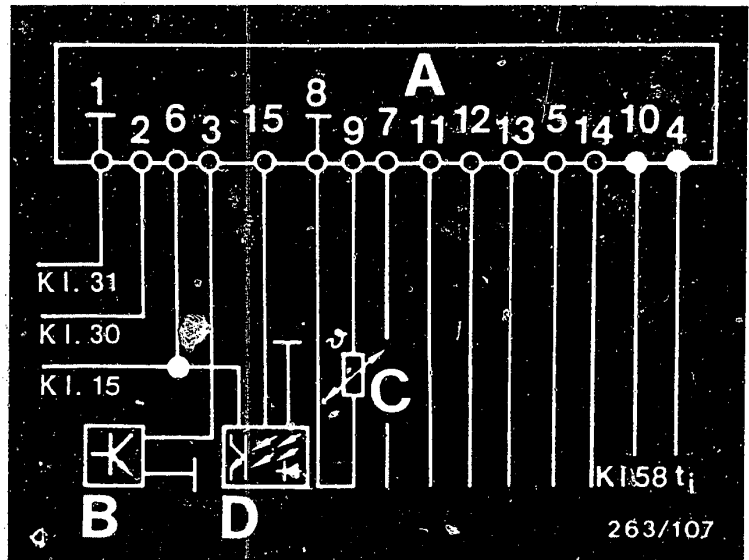
Possible faults:

Voltage stabilization for tank sender defective.  
(Voltage is generated by instrument cluster).

Open circuit/contact resistance in lead to tank sender.

Eliminate open circuit / contact resistance.

After replacing the voltage stabilization unit, it is necessary  
to re-set the tank range (miles to empty) on the trip computer.



**D17**

Test with universal test adapter  
Alfa Romeo, trip computer



**D18**

Test with universal test adapter  
Alfa Romeo, trip computer



Calibration of range of tank with keys "b" and "c" (see top picture)

Assuming that each supplied trip computer is preset at a nominal voltage of the tank sender corresponding to a fuel quantity of 7 l, it is possible to make a further, more accurate calibration which compensates for the tolerances of the tank and of the tank sender.

This calibration is performed as follows:

- Contents of tank must be precisely 7 liters
- Ignition on (not important whether engine running)
- Simultaneously press key "b" and key "c" > 1 sec:  
trip computer is in "calibration mode" when 0 km appears on the display.
- By turning the calibration potentiometer (through hole in key "b", see bottom picture), set display to 65...70, corresponding to 7 l in tank (see picture 6).

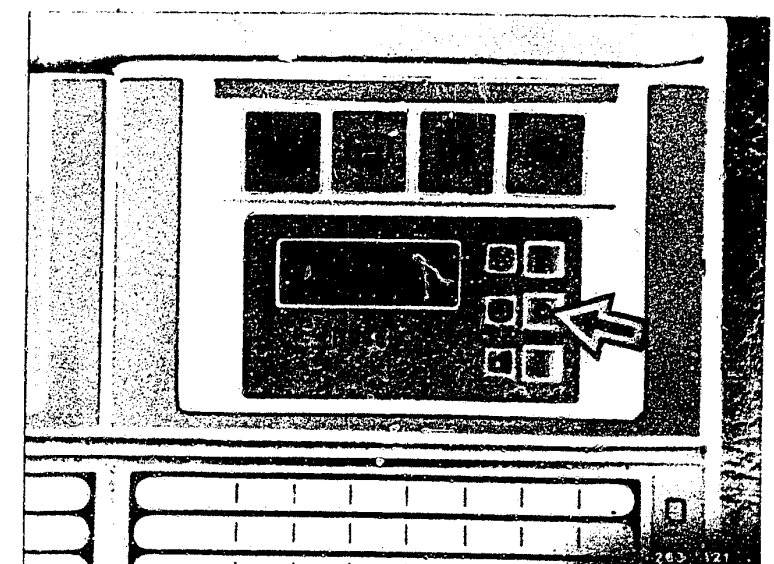
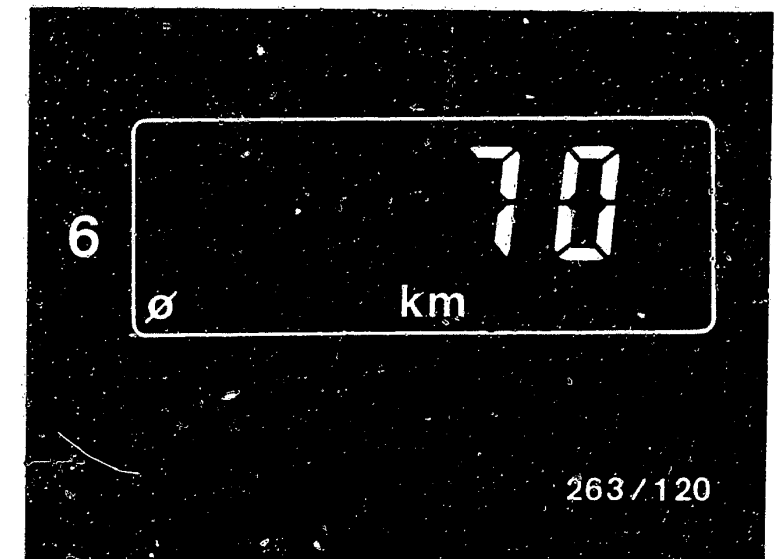
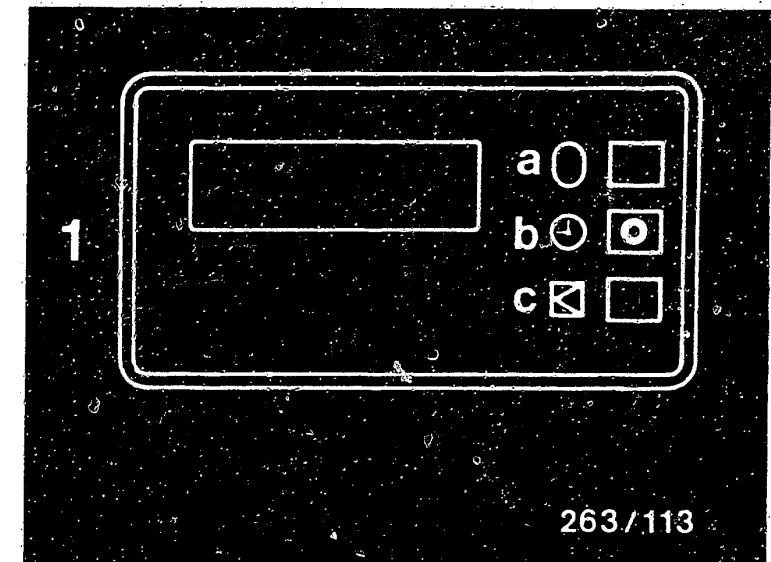
N o t e :

Potentiometer has a turning angle of max. 270°.

Turn carefully.

If previous range is known, the tank need not be emptied down to 7 l; the previous range can be set straight away at calibration potentiometer (in key "b"). Proceed in the same sequence as if 7 l in tank.

Calibration is completed when, after setting the above value, a different function is selected.



**D19**

Test with universal test adapter  
Alfa Romeo, trip computer

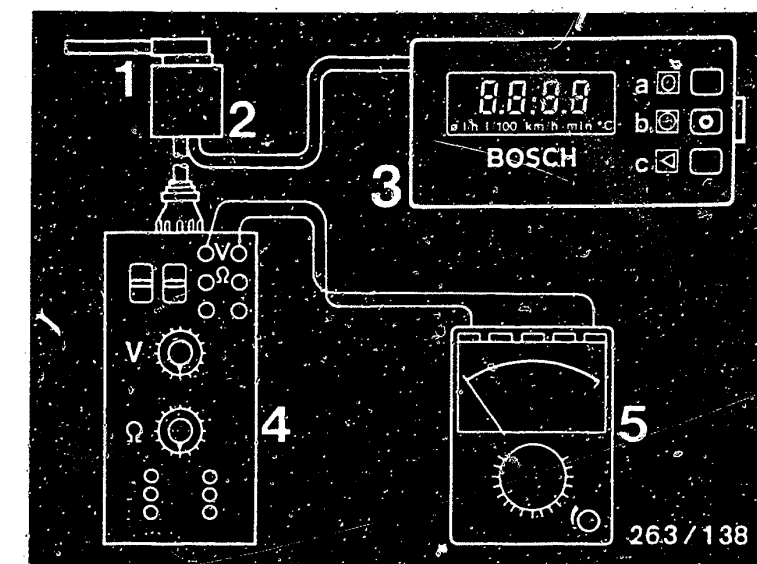


**D20**

Test with universal test adapter  
Alfa Romeo, trip computer



<u>Test step 15</u>			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V" at position:</u>	5	On multimeter: $V_{\text{batt}} \geq 12 \text{ V}$	<u>Component:</u> Power supply to trip computer through ignition lock
<u>Program switch "Ω" at position:</u>	-		
<u>Measuring equipment:</u> Multimeter (V-range)		If reading O.K., continue testing with <u>next test step.</u>	<u>Operation:</u> Voltage measurement, continuity
<u>Measuring range:</u> 0 ... 15 V			
<u>Connection:</u> Red test sockets = positive Black test sockets = negative			<u>Malfunction:</u> No voltage after "ignition ON" > Battery voltage
<u>Operation in vehicle:</u> Ignition "ON"			



- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

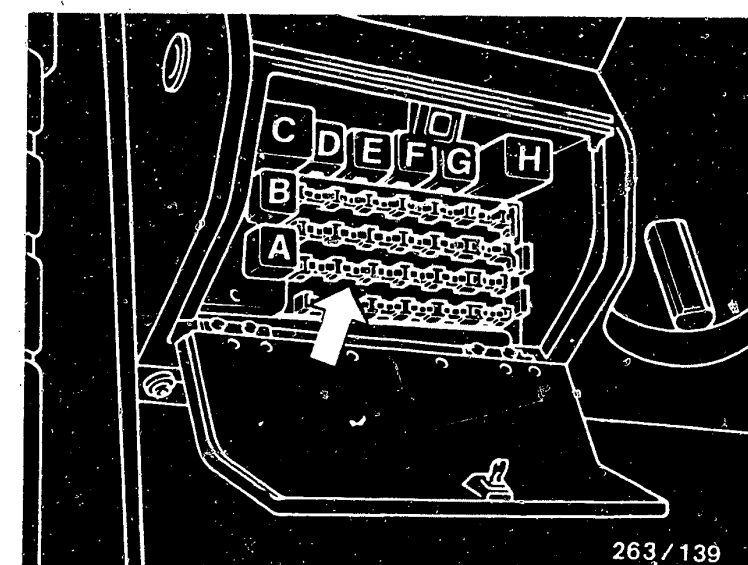
#### Possible faults:

Open circuit / contact resistance in lead between ignition lock term. 15 and trip computer pin 6.

Fuse No. 21 defective (see bottom picture, arrow).

Eliminate open circuit / contact resistance.

Replace defective fuse.



**D21**

Test with universal test adapter  
Alfa Romeo, trip computer



**D22**

Test with universal test adapter  
Alfa Romeo, trip computer





<u>Test step 16</u>		<u>Reading</u>	<u>Testing</u>
<u>Operation</u>			
<u>Program switch "V"</u> <u>at position:</u>	6	On multimeter: approx. 1.7 V at room temperature (approx. +20°C)	<u>Component:</u> Outside temperature sensor with leads.
<u>Program switch "Ω"</u> <u>at position:</u>	-		
<u>Measuring equipment:</u> Multimeter (V range)			If reading O.K., continue testing with <u>next test step.</u>
<u>Measuring range:</u> 0 ... 5 V		<u>Malfunction:</u> No reading / reading incorrect	
<u>Connection:</u> Red test socket = positive Black test socket = negative			
<u>Operation in vehicle:</u> Ignition ON			

#### Possible faults:

Outside temperature sensor mechanically damaged, e.g. broken off - visual examination (bottom picture). Reading  $\geq +80^{\circ}\text{C}$  at normal room temperature (approx. +20°C) points to short circuit in lead.

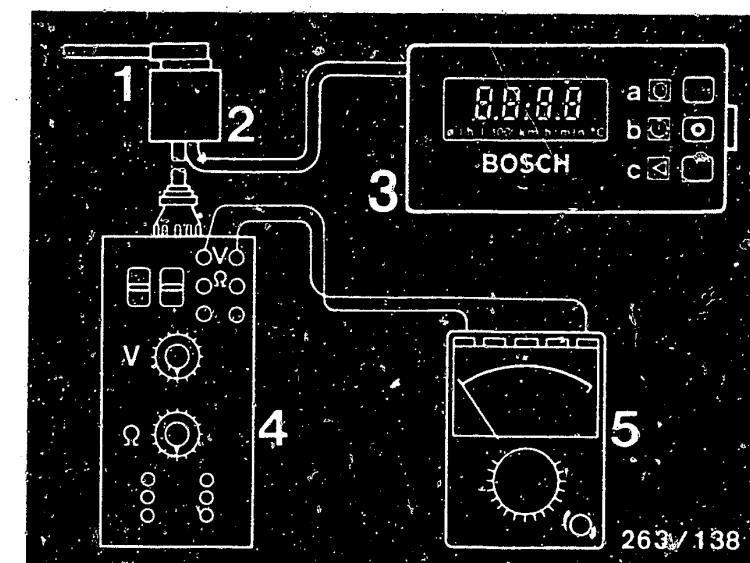
Reading  $\leq -35^{\circ}\text{C}$  at normal room temperature (approx. +20°C) points to open circuit in lead.

A temperature reading which is obviously too low points to corrosion at the plug-in connections to the trip computer wiring harness.

Eliminate open circuit / contact resistance.

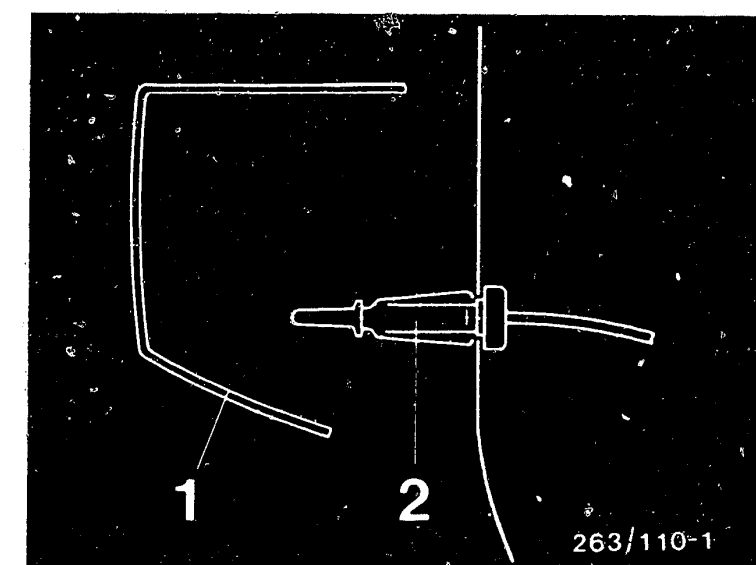
Replace defective outside temperature sensor or defective lead.

To remove, press together the two spring-loaded locking lugs and withdraw outside temperature sensor toward the rear.



- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

- 1 = Front bumper
- 2 = Outside temperature sensor



**D23**

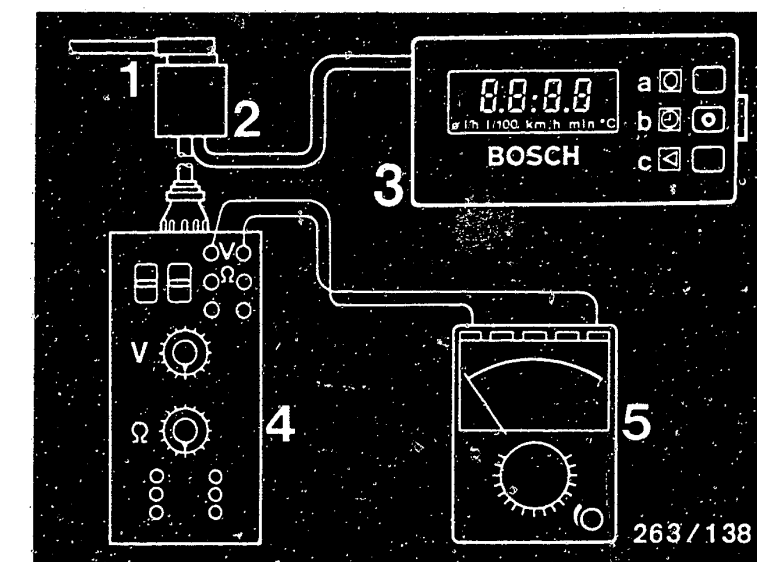
Test with universal test adapter  
Alfa Romeo, trip computer



**D24**

Test with universal test adapter  
Alfa Romeo, trip computer





- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter



<u>Test step 17</u>			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> <u>at position:</u>	7	On multimeter:  $V_{batt} \geq 12 V$	<u>Component:</u>  Power supply for trip computer illumination
<u>Program switch "Ω"</u> <u>at position:</u>	-		
<u>Measuring equipment:</u> Multimeter (V-range)		If reading O.K., continue testing with <u>next test step.</u>	<u>Operation:</u>  Illumination of display
<u>Measuring range:</u> 0 ... 15 V			<u>Malfunction:</u>  No illumination
<u>Connection:</u> Red test sockets = positive Black test sockets = negative			
<u>Operation in vehicle:</u> Ignition "ON" Lights on			

#### Possible faults:

Open circuit / contact resistance in lead between term. 58 and trip computer pin 10.

Bulb in trip computer defective (bottom picture, arrow).

Check whether plug on trip computer is correctly seated/correctly contacting.

Eliminate open circuit / contact resistance.

Replace defective bulb.

**E1**

Test with universal test adapter  
Alfa Romeo, trip computer

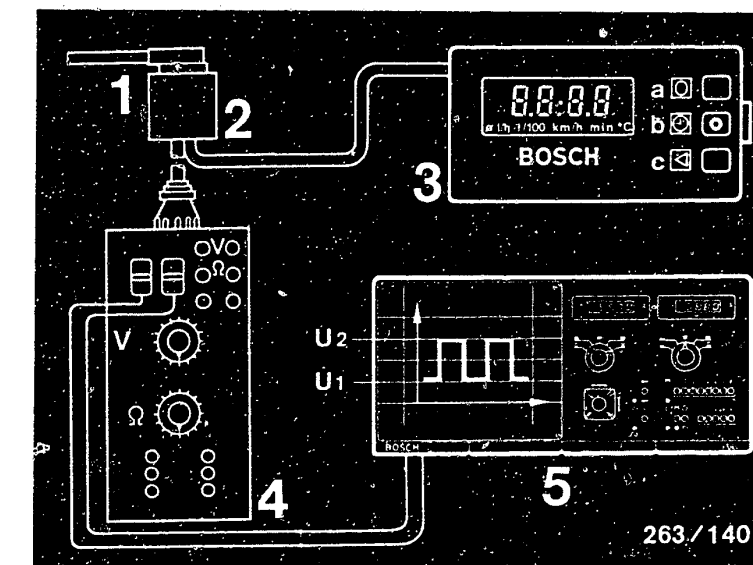


**E2**

Test with universal test adapter  
Alfa Romeo, trip computer



Test step 18 (not applicable for Alfa 90 with L-Jetronic/Motronic CEM*, pin 7 not occupied)			
Operation		Reading	Testing
Program switch "V" at position:	8	On oscilloscope of motortester:	Component: Encoding lead 2
Program switch "Ω" at position:	-	Oscilloscope pattern similar to the one shown (see top diagram in motortester)	
Measuring equipment: e.g. motortester MOT 201		$\geq 3 \text{ V}$	Operation: Detecting on oscilloscope whether pulsed voltage is detectable.
Measuring range: -----			
Connection: Test wells on universal test adapter		If reading O.K., continue testing with next test step.	Malfunction: No oscilloscope pattern
Operation in vehicle: Engine idling			

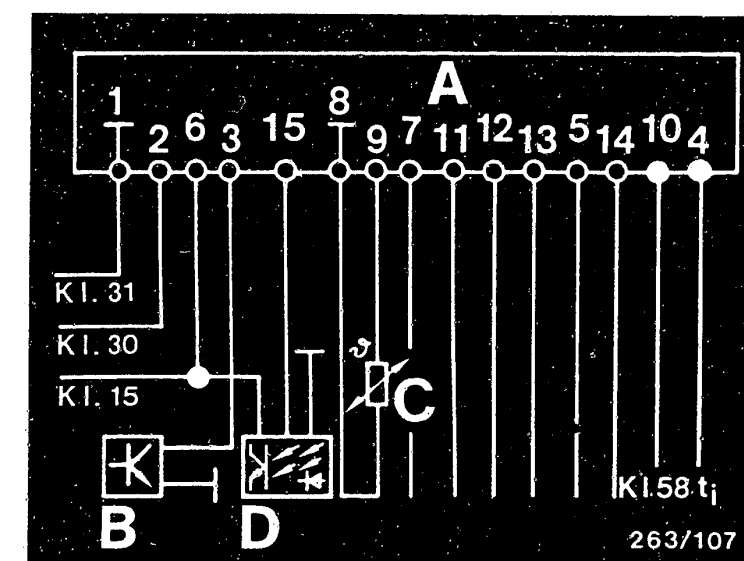


- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Motortester with oscilloscope of  $t_i$  signal

#### Possible faults:

Open circuit / contact resistance in lead between pin 7 on trip computer plug and ground connection (central ground).

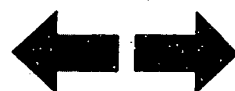
Eliminate open circuit / contact resistance.



\* CEM = Motronic of Italian origin

**E3**

Test with universal test adapter  
Alfa Romeo, trip computer

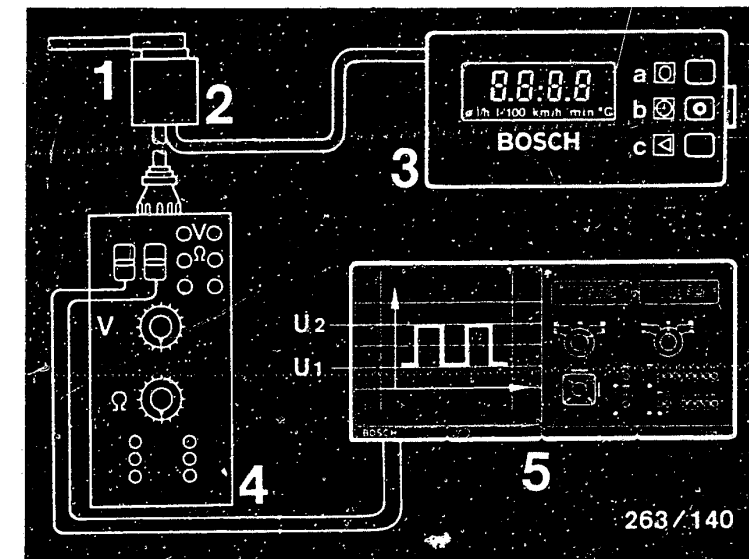


**E4**

Test with universal test adapter  
Alfa Romeo, trip computer



Test step 19 (not applicable for Alfa 90 with L-Jetronic/Motronic, pin 11 not occupied)			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V" at position:</u>	9	On oscilloscope of motortester:	<u>Component:</u> Encoding lead 3
<u>Program switch "Ω" at position:</u>	-	Oscilloscope pattern similar to the one shown (see top diagram in motortester)	
<u>Measuring equipment:</u> e.g. motortester MOT 201		≥ 3 V	<u>Operation:</u> Detecting on oscilloscope whether pulsed voltage is detectable.
<u>Measuring range:</u> -----			
<u>Connection:</u> Test wells on universal test adapter			If reading O.K., continue testing with next test step.
<u>Operation in vehicle:</u> Engine idling			

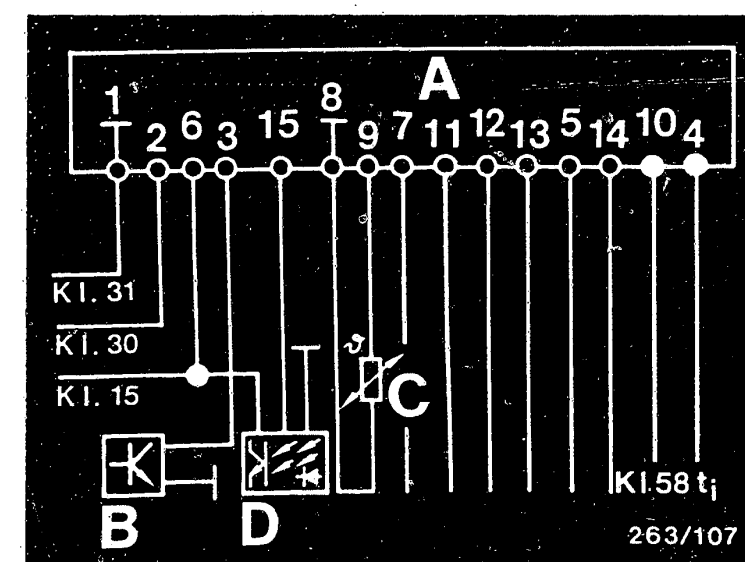


- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Motortester with oscilloscope of  $t_i$  signal

#### Possible faults:

Open circuit / contact resistance in lead between pin 11 on trip computer plug and ground connection (central ground).

Eliminate open circuit / contact resistance.



**E5**

Test with universal test adapter  
Alfa Romeo, trip computer

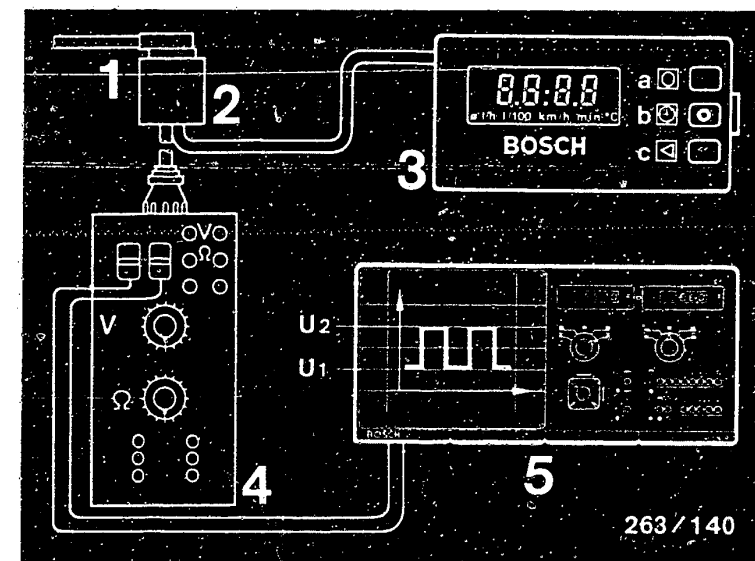


**E6**

Test with universal test adapter  
Alfa Romeo, trip computer



Test step 20 (not applicable for Alfa 90 with L-Jetronic/CEM*, pin 12 not occupied)			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V" at position:</u>	10	On oscilloscope of motortester:  Oscilloscope pattern similar to the one shown (see top diagram in motortester)  ≥ 3 V  If reading O.K., continue testing with next test step.	<u>Component:</u>  Encoding lead 4
<u>Program switch "Ω" at position:</u>	-		
<u>Measuring equipment:</u> e.g. motortester MOT 201			
<u>Measuring range:</u> -----			
<u>Connection:</u> Test wells on universal test adapter			
<u>Operation in vehicle:</u> Engine idling			<u>Malfunction:</u>  No oscilloscope pattern



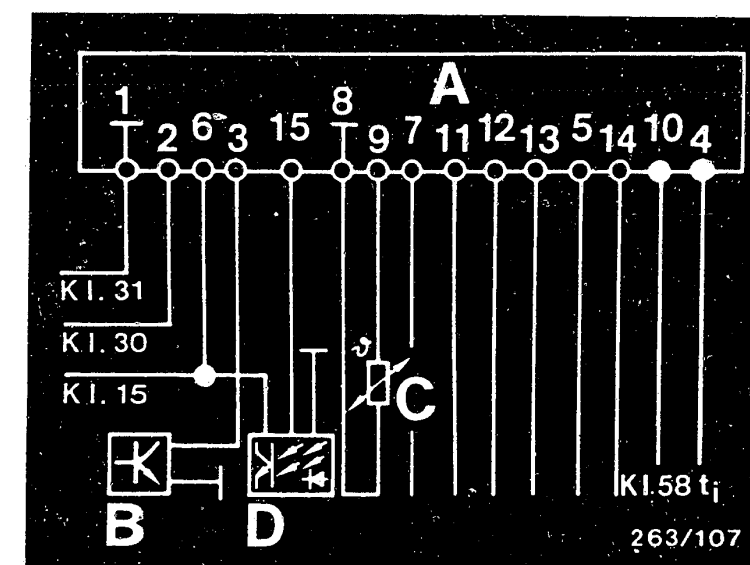
- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Motortester with oscilloscope of  $t_i$  signal

#### Possible faults:

Open circuit / contact resistance in lead between pin 12 on trip computer plug and ground connection (central ground).

Eliminate open circuit / contact resistance.

\* CEM = Motronic of Italian origin



**E7**

Test with universal test adapter  
Alfa Romeo, trip computer

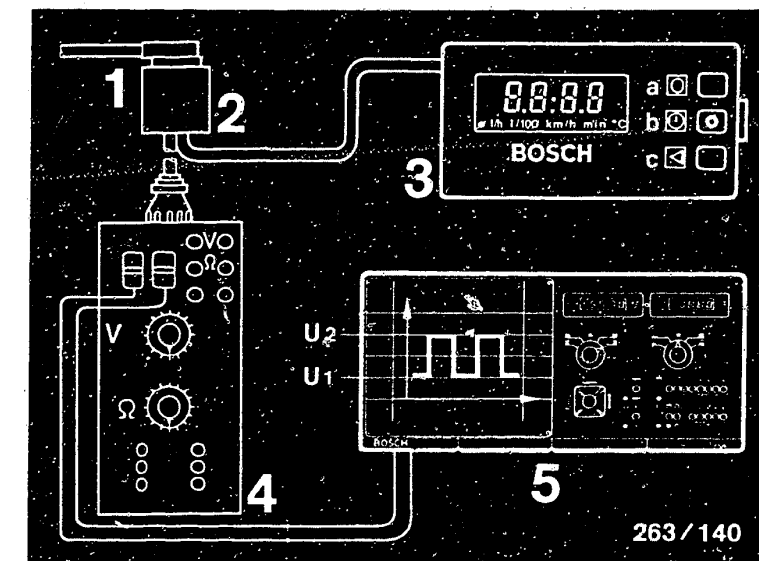


**E8**

Test with universal test adapter  
Alfa Romeo, trip computer



Test step 21 (not applicable for Alfa 90 with L-Jetronic/Motronic/CEM*, pin 13 not occupied)			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V" at position:</u>	11	On oscilloscope of motortester:  Oscilloscope pattern similar to the one shown (see top diagram in motortester)  $\geq 3 \text{ V}$  If reading O.K., continue testing with next test step.	<u>Component:</u> Encoding lead 5
<u>Program switch "Ω" at position:</u>	-		
<u>Measuring equipment:</u> e.g. motortester MOT 201			<u>Operation:</u> Detecting on oscilloscope whether pulsed voltage is detectable.
<u>Measuring range:</u> -----			
<u>Connection:</u> Test wells on universal test adapter			<u>Malfunction:</u> No oscilloscope pattern
<u>Operation in vehicle:</u> Engine idling			



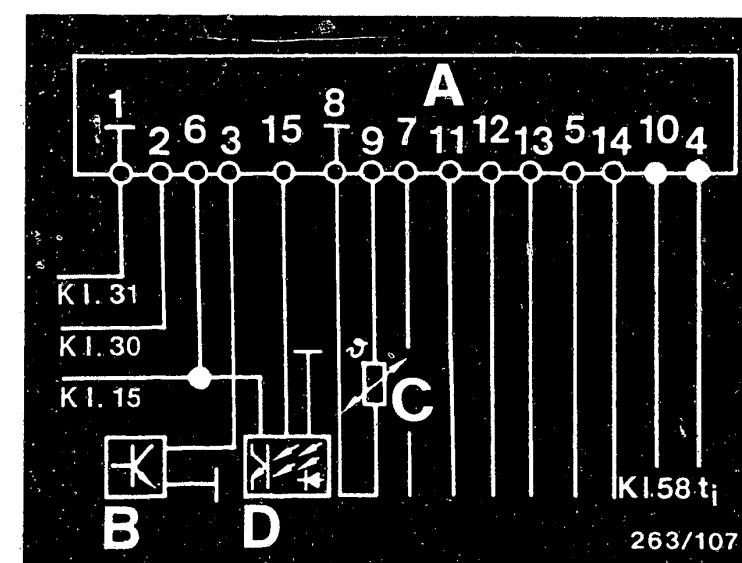
- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Motortester with oscilloscope of  $t_i$  signal

#### Possible faults:

Open circuit / contact resistance in lead between pin 13 on trip computer plug and ground connection (central ground).

Eliminate open circuit / contact resistance.

\* CEM = Motronic of Italian origin



**E9**

Test with universal test adapter  
Alfa Romeo, trip computer



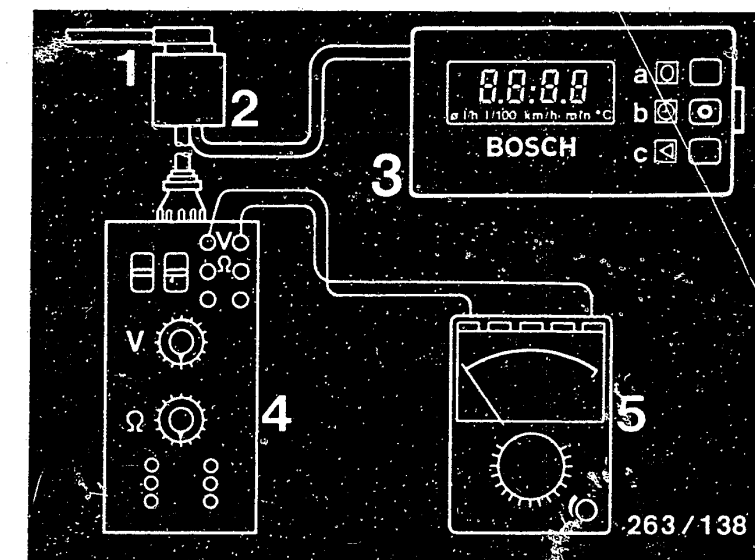
**E10**

Test with universal test adapter  
Alfa Romeo, trip computer



Test step 22 (not applicable for Alfa 90 with L-Jetronic/CEM\*, pin 14 not occupied)

<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> <u>at position:</u>	12	On multimeter:  approx. 12 V   <	



- 1 = 15-pin plug on vehicle wiring harness
- 2 = Adapter lead
- 3 = Trip computer
- 4 = Universal test adapter
- 5 = Multimeter

#### Possible faults:

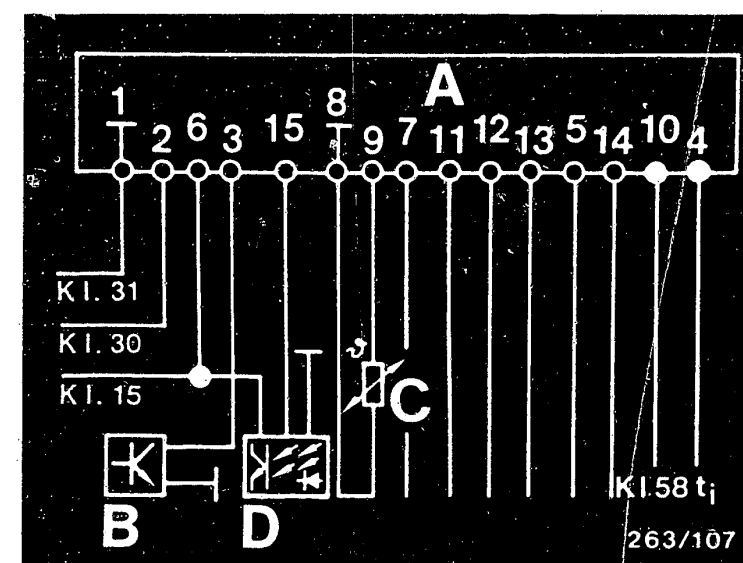
Voltage stabilization for tank sender defective.  
(Voltage is generated by instrument cluster).

Open circuit/contact resistance in lead to tank sender.

Eliminate open circuit / contact resistance.

After replacing the voltage stabilization unit, it is necessary  
to re-set the tank range (miles to empty) on the trip computer.

\* CEM = Motronic of Italian origin.



**E11**

Test with universal test adapter  
Alfa Romeo, trip computer



**E12**

Test with universal test adapter  
Alfa Romeo, trip computer



Calibration of range of tank with keys "b" and "c" (see top picture)

Assuming that each supplied trip computer is preset at a nominal voltage of the tank sender corresponding to a fuel quantity of 7 l, it is possible to make a further, more accurate calibration which compensates for the tolerances of the tank and of the tank sender.

This calibration is performed as follows:

- Contents of tank must be precisely 7 liters
- Ignition on (not important whether engine running)
- Simultaneously press key "b" and key "c" > 1 sec:  
trip computer is in "calibration mode" when 0 km appears on the display.
- By turning the calibration potentiometer (through hole in key "b", see bottom picture), set display to 65...70, corresponding to 7 liters in tank (see picture 6).

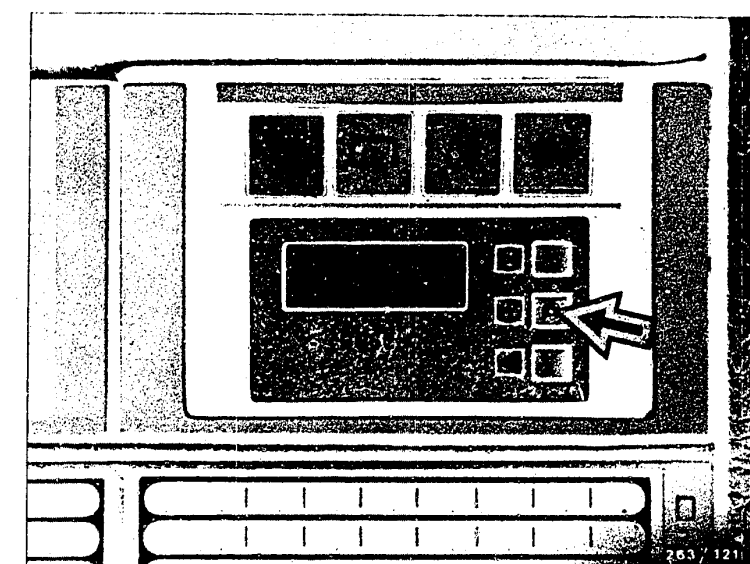
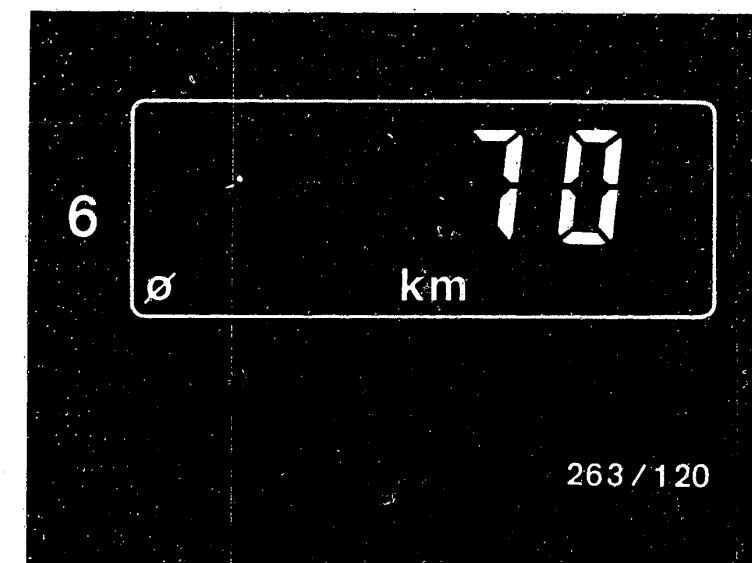
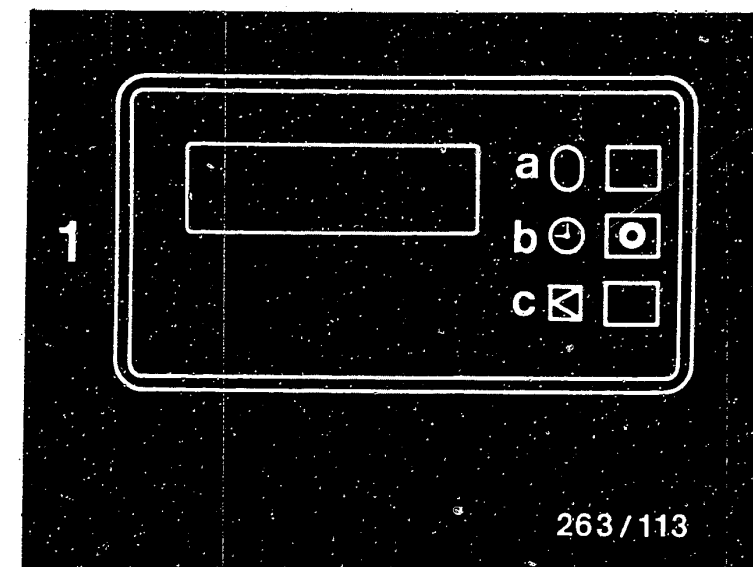
Note:

Potentiometer has a turning angle of max. 270°.

Turn carefully.

If previous range is known, the tank need not be emptied down to 7 l; the previous range can be set straight away at calibration potentiometer (in key "b"). Proceed in the same sequence as if 7 l in tank.

Calibration is completed when, after setting the above value, a different function is selected.



**E13**

Test with universal test adapter  
Alfa Romeo, trip computer



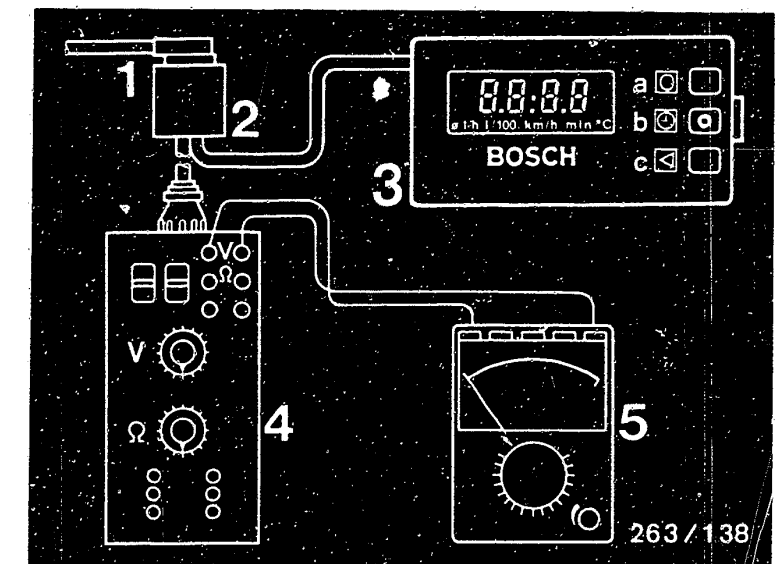
**E14**

Test with universal test adapter  
Alfa Romeo, trip computer

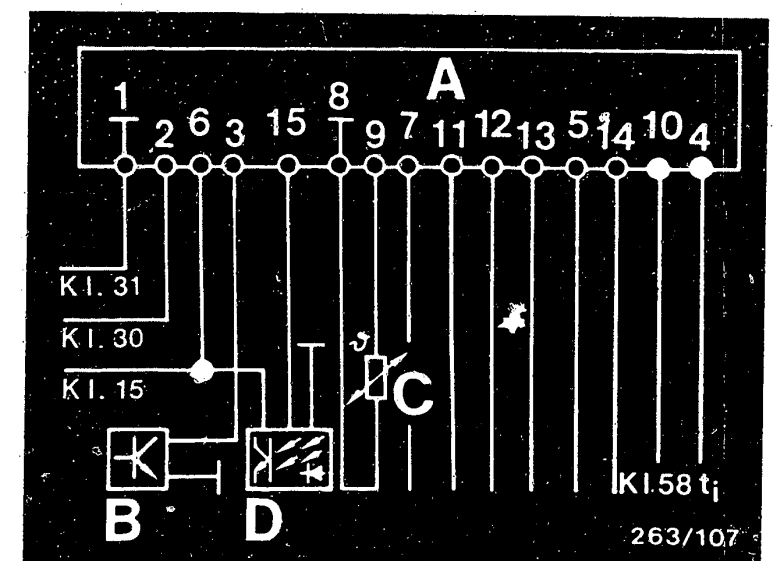




Test 23 (not applicable for Alfa 90 with L-Jetronic/CEM*, pin 14 not occupied)			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V" at position:</u>	12	On multimeter:  Tank full approx.1,5 V Tank 3/4 full approx.3,5 V Tank 1/2 full approx.5,0 V Tank 1/4 full approx.6,7 V Reserve tank approx.7,0 V Tank empty approx.7,5 V	<u>Component:</u>  Tank sender with lead
<u>Program switch "Ω" at position:</u>	-		
<u>Measuring equipment:</u> Multimeter (V range)			<u>Operation:</u> Voltage measurement
<u>Measuring range:</u> 0 ... 15 V			
<u>Connection:</u> Red test socket = positive Black test socket = negative		If reading O.K., continue testing with <u>next test step.</u>	<u>Malfunction:</u> No reading or reading incorrect
<u>Operation in vehicle:</u>  Ignition ON		Plug connected to tank sender.	



- 1 = 15-pin plug on vehicle wiring harness  
2 = Adapter lead  
3 = Trip computer  
4 = Universal test adapter  
5 = Multimeter



#### Possible faults:

Tank sender defective or open circuit / contact resistance in lead between tank sender and trip computer plug pin 14.

Eliminate open circuit / contact resistance.

Replace defective tank sender / lead.

#### Note:

After replacing the tank sender, it is necessary to re-set the tank range (miles to empty) on the trip computer.

\* CEM = Motronic of Italian origin

**E15**

Test with universal test adapter  
Alfa Romeo, trip computer



**E16**

Test with universal test adapter  
Alfa Romeo, trip computer



### Calibration of range of tank with keys "b" and "c" (see top picture)

Assuming that each supplied trip computer is preset at a nominal voltage of the tank sender corresponding to a fuel quantity of 7 l, it is possible to make a further, more accurate calibration which compensates for the tolerances of the tank and of the tank sender.

This calibration is performed as follows:

- Contents of tank must be precisely 7 liters
- Ignition on (not important whether engine running)
- Simultaneously press key "b" and key "c" > 1 sec:  
trip computer is in "calibration mode" when 0 km appears on the display.
- By turning the calibration potentiometer (through hole in key "b", see bottom picture), set display to 65...70, corresponding to 7 liters in tank (see picture 6).

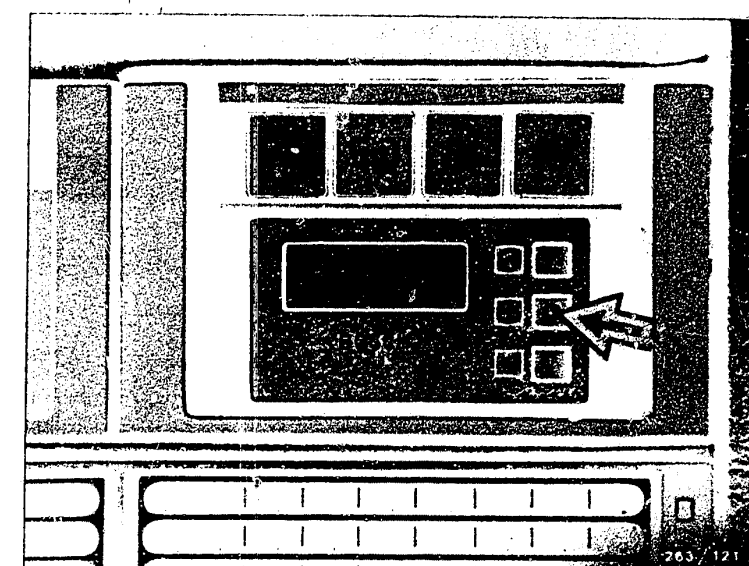
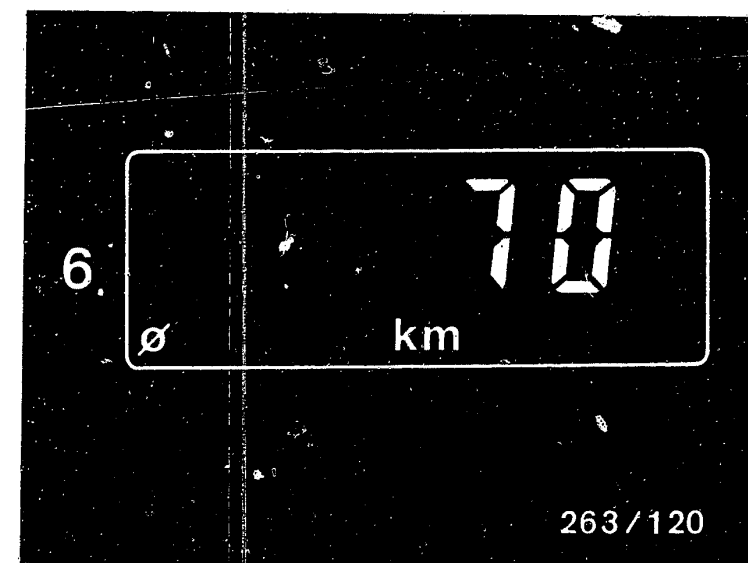
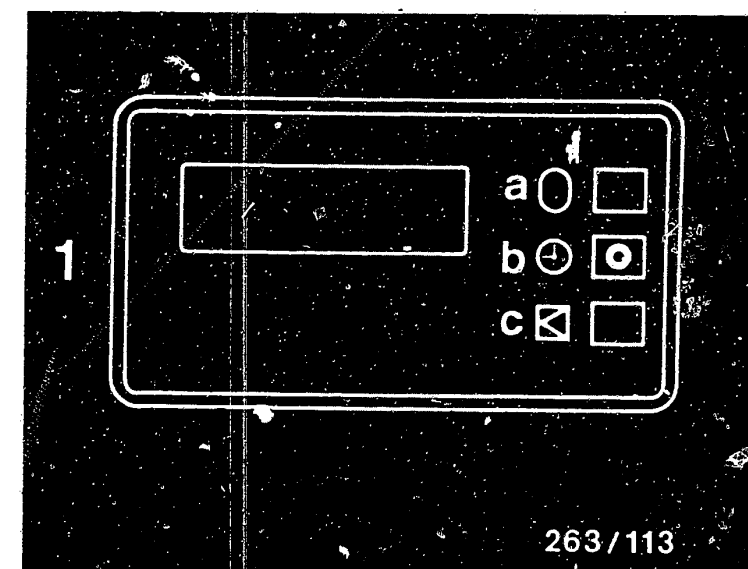
### Note :

Potentiometer has a turning angle of max. 270°.

Turn carefully.

If previous range is known, the tank need not be emptied down to 7 l; the previous range can be set straight away at calibration potentiometer (in key "b"). Proceed in the same sequence as if 7 l in tank.

Calibration is completed when, after setting the above value, a different function is selected.



**E17**

Test with universal test adapter  
Alfa Romeo, trip computer



**E18**

Test with universal test adapter  
Alfa Romeo, trip computer



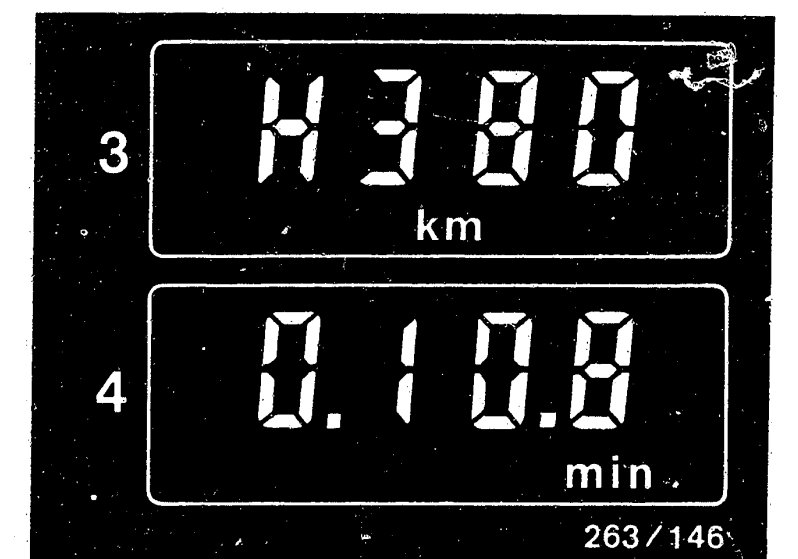
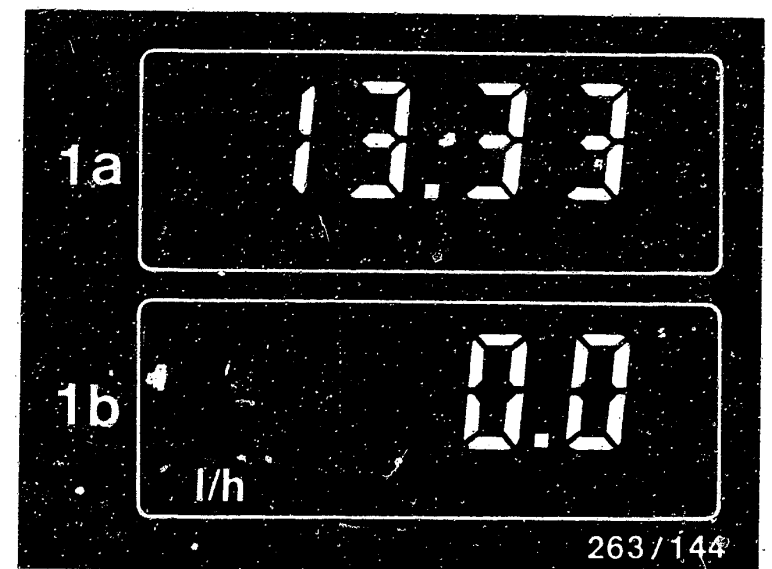
7. Functional test of trip computer (extract from owner manual)

Functional test with ignition OFF

1. Only time of day is indicated.  
No other functions can be selected (see picture 1a).

Functional test with ignition ON - engine not running, key c has been pressed

1. Without selecting a different trip computer function, time of day continues to be displayed (if tank contents > 7 l and battery not disconnected) (see picture 1a).
2. Select "inst. consumption". Instantaneous consumption 0.0 l/h is shown (vehicle and engine stopped). (See picture 1b).
3. Select "ave. consumption". The last calculated average consumption is shown. (See picture 2a).
4. Select "ave. speed". The last calculated average speed is shown. (See picture 2b).
5. Select "tank range (miles to empty)". Tank range, depending on tank level, is indicated. (See picture 3).
6. Select "stopwatch". The time as of pressing the start key is indicated. (See picture 4).
7. Select "outside temperature". The actual outside temperature is indicated (no illustration here).



**E19**

Final functional test  
Alfa Romeo, trip computer



**E20**

Final functional test  
Alfa Romeo, trip computer

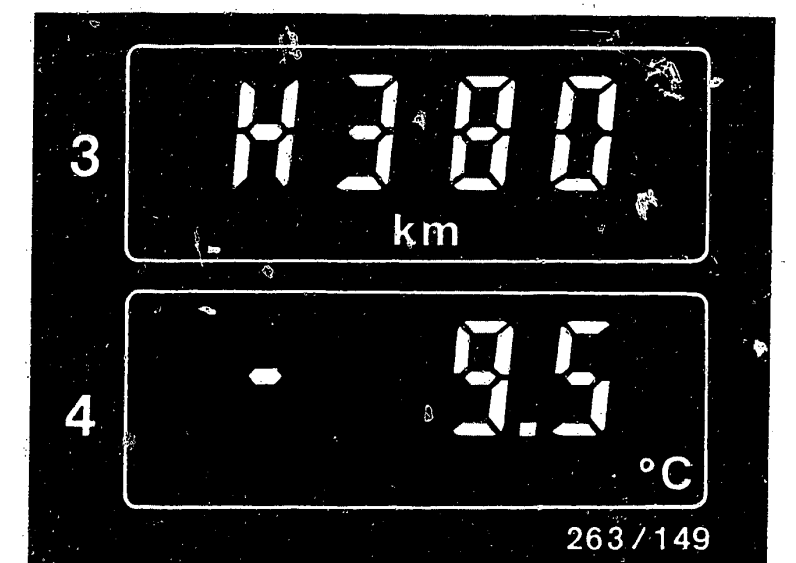
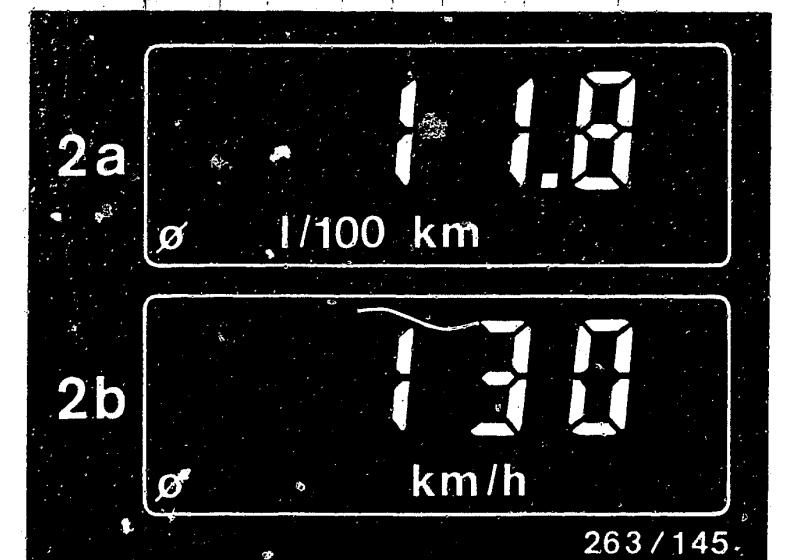
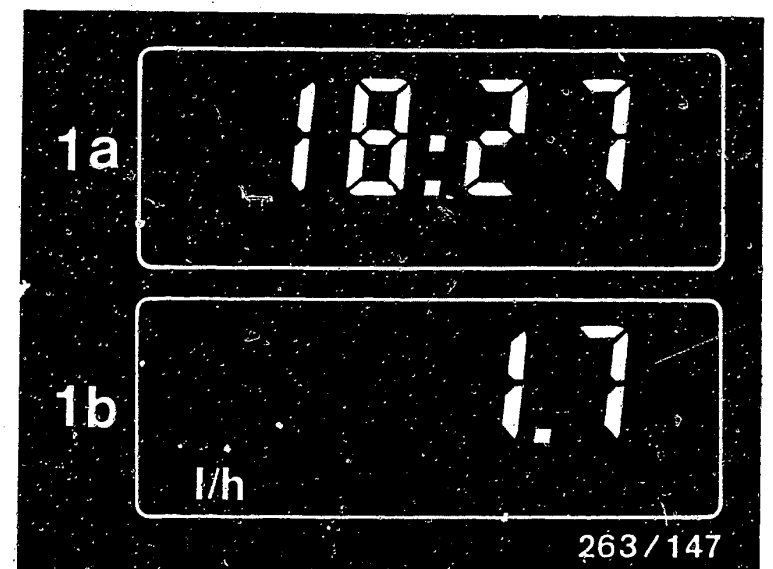


### Functional test of trip computer (continued)

#### Functional test - engine running (idle speed), vehicle stopped

1. When the time priority key is pressed, the time of day is shown. (See picture 1a).
2. When "inst. consumption" is selected, the actual instantaneous consumption in l/h is shown. (See picture 1b).
3. When "ave. consumption" is selected, the last calculated average consumption is shown (vehicle stationary). (See picture 2a).
4. When "ave. speed" is selected, the last calculated average speed is shown. (See picture 2b).
5. When "tank range (miles to empty)" is selected, a reading corresponding to the tank level is shown (value between 0 and approx. 600 km). (See picture 3).
6. When "stopwatch" is selected, the time as of pressing the start button is shown. (No illustration here).
7. When "outside temperature" is selected, the actual outside temperature is shown. (See picture 4).

If all these functions can be selected, trip computer and input signals are O.K.



**E21**

Final functional test  
Alfa Romeo, trip computer



**E22**

Final functional test  
Alfa Romeo, trip computer



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